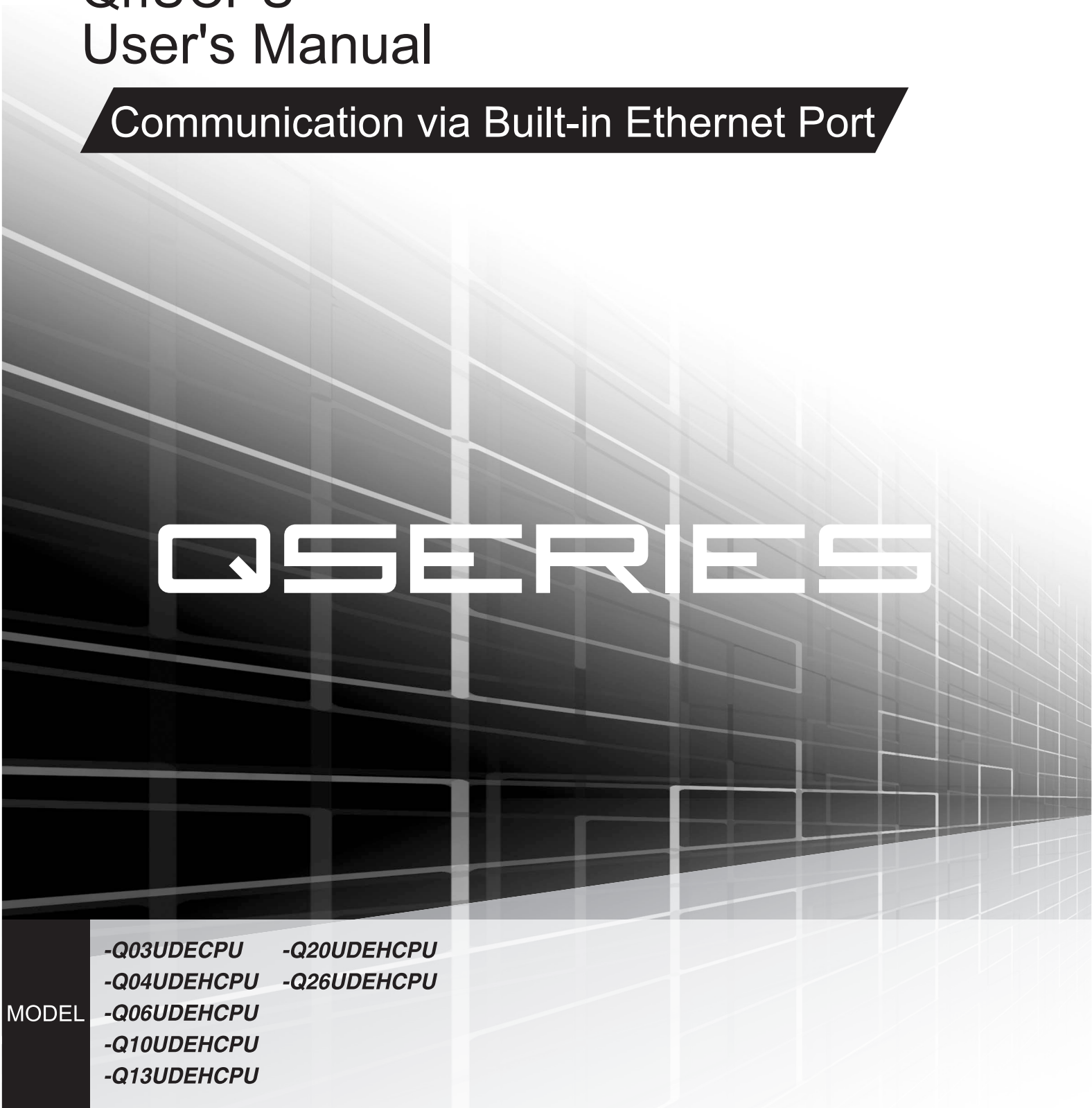
MITSUBISHI

Mitsubishi Programmable Controller

MELSEC Q series

QnUCPU User's Manual

Communication via Built-in Ethernet Port



MODEL

-Q03UDECPU
-Q04UDEHCPU
-Q06UDEHCPU
-Q10UDEHCPU
-Q13UDEHCPU
-Q20UDEHCPU
-Q26UDEHCPU

●SAFETY PRECAUTIONS●

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

In this manual, the safety precautions are classified into two levels: "⚠DANGER" and "⚠CAUTION".

⚠ DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Under some circumstances, failure to observe the precautions given under "⚠CAUTION" may lead to serious consequences.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠DANGER

● Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.

(1) Configure external safety circuits, such as an emergency stop circuit, protection circuit, and protective interlock circuit for forward/reverse operation or upper/lower limit positioning.

(2) The programmable controller stops its operation upon detection of the following status, and the output status of the system will be as shown below.

Status	Output
Overcurrent or overvoltage protection of the power supply module is activated.	All outputs are turned off.
The CPU module detects an error such as a watchdog timer error by the self-diagnostic function.	All outputs are held or turned off according to the parameter setting.

All outputs may turn on when an error occurs in the part, such as I/O control part, where the CPU module cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the programmable controller. For a fail-safe circuit example, refer to Chapter 10 LOADING AND INSTALLATION in the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

(3) Outputs may remain on or off due to a failure of an output module relay or transistor. Configure an external circuit for monitoring output signals that could cause a serious accident.

[Design Precautions]

⚠DANGER

- In an output module, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.

- Configure a circuit so that the programmable controller is turned on first and then the external power supply.
  If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.

- For the operating status of each station after a communication failure, refer to relevant manuals for the network.
  Incorrect output or malfunction due to a communication failure may result in an accident.

- When changing data of the running programmable controller from a peripheral connected to the CPU module or from a personal computer connected to an intelligent function module, configure an interlock circuit in the sequence program to ensure that the entire system will always operate safely. For program modification and operating status change, read relevant manuals carefully and ensure the safety before operation.
  Especially, in the case of a control from an external device to a remote programmable controller, immediate action cannot be taken for a problem on the programmable controller due to a communication failure.
  To prevent this, configure an interlock circuit in the sequence program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.

⚠CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables.
  Keep a distance of 100mm (3.94 inches) or more between them.
  Failure to do so may result in malfunction due to noise.

- When a device such as a lamp, heater, or solenoid valve is controlled through an output module, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on.
  Take measures such as replacing the module with one having a sufficient current rating.

[Installation Precautions]

⚠CAUTION

- Use the programmable controller in an environment that meets the general specifications in the QCPU User's Manual (Hardware Design, Maintenance and Inspection).
  Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.

- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
  Incorrect mounting may cause malfunction, failure or drop of the module.
  When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
  Tighten the screw within the specified torque range.
  Undertightening can cause drop of the screw, short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

- When using an extension cable, connect it to the extension cable connector of the base unit securely.
  Check the connection for looseness.
  Poor contact may cause incorrect input or output.

- When using a memory card, fully insert it into the memory card slot.
  Check that it is inserted completely.
  Poor contact may cause malfunction.

- Shut off the external power supply for the system in all phases before mounting or removing the module. Failure to do so may result in damage to the product.
  A module can be replaced online (while power is on) on any MELSECNET/H remote I/O station or in the system where a CPU module supporting the online module change function is used.
  Note that there are restrictions on the modules that can be replaced online, and each module has its predetermined replacement procedure.
  For details, refer to the relevant sections in the QCPU User's Manual (Hardware Design, Maintenance and Inspection) and in the manual for the corresponding module.

- Do not directly touch any conductive part of the module.
  Doing so can cause malfunction or failure of the module.

- When using a Motion CPU module and modules designed for motion control, check that the combinations of these modules are correct before applying power.
  The modules may be damaged if the combination is incorrect.
  For details, refer to the user's manual for the Motion CPU module.

[Wiring Precautions]

DANGER

- Shut off the external power supply for the system in all phases before wiring.
  Failure to do so may result in electric shock or damage to the product.

- After wiring, attach the included terminal cover to the module before turning it on for operation.
  Failure to do so may result in electric shock.

CAUTION

- Ground the FG and LG terminals to the protective ground conductor dedicated to the programmable controller.
  Failure to do so may result in electric shock or malfunction.

- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.

- Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly.
  Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.

- Connectors for external connection must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered.
  Incomplete connections could result in short circuit, fire, or malfunction.

- Tighten the terminal screw within the specified torque range.
  Undertightening can cause short circuit, fire, or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

- Prevent foreign matter such as dust or wire chips from entering the module.
  Such foreign matter can cause a fire, failure, or malfunction.

- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring.
  Do not remove the film during wiring.
  Remove it for heat dissipation before system operation.

[Wiring Precautions]

⚠CAUTION

- Mitsubishi programmable controllers must be installed in control panels.
  Connect the main power supply to the power supply module in the control panel through a relay terminal block.
  Wiring and replacement of a power supply module must be performed by maintenance personnel who is familiar with protection against electric shock. (For wiring methods, refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection)).

[Startup and Maintenance Precautions]

⚠DANGER

- Do not touch any terminal while power is on.
  Doing so will cause electric shock.

- Correctly connect the battery connector.
  Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire.
  Doing so will cause the battery to produce heat, explode, or ignite, resulting in injury and fire.

- Shut off the external power supply for the system in all phases before cleaning the module or retightening the terminal screws or module fixing screws.
  Failure to do so may result in electric shock.
  Undertightening the terminal screws can cause short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

⚠CAUTION

- Before performing online operations (especially, program modification, forced output, and operation status change) for the running CPU module from the peripheral connected, read relevant manuals carefully and ensure the safety.
  Improper operation may damage machines or cause accidents.

- Do not disassemble or modify the modules.
  Doing so may cause failure, malfunction, injury, or a fire.

- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm (9.85 inches) away in all directions from the programmable controller.
  Failure to do so may cause malfunction.

[Startup and Maintenance Precautions]

⚠CAUTION

- Shut off the external power supply for the system in all phases before mounting or removing the module. Failure to do so may cause the module to fail or malfunction.
  A module can be replaced online (while power is on) on any MELSECNET/H remote I/O station or in the system where a CPU module supporting the online module change function is used.
  Note that there are restrictions on the modules that can be replaced online, and each module has its predetermined replacement procedure.
  For details, refer to the relevant sections in the QCPU User's Manual (Hardware Design, Maintenance and Inspection) and in the manual for the corresponding module.

- After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module more than 50 times (IEC 61131-2 compliant) respectively.
  Exceeding the limit of 50 times may cause malfunction.

- Do not drop or apply shock to the battery to be installed in the module.
  Doing so may damage the battery, causing the battery fluid to leak inside the battery.
  If the battery is dropped or any shock is applied to it, dispose of it without using.

- Before handling the module, touch a grounded metal object to discharge the static electricity from the human body.
  Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

⚠CAUTION

- When disposing of this product, treat it as industrial waste.
  When disposing of batteries, separate them from other wastes according to the local regulations.
  (For details of the Battery Directive in EU countries, refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection).)

[Transportation Precautions]

⚠CAUTION

- When transporting lithium batteries, follow the transportation regulations.
  (For details of the regulated models, refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection).)

REVISIONS

*The manual number is given on the bottom left of the back cover.

Print date	*Manual number	Revision
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Japanese manual version SH-080806-A

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Memo

INTRODUCTION

This manual describes the function of the Universal model QCPU using Ethernet communication.

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the Q series programmable controller to handle the product correctly.

■Relevant CPU module

CPU module	Model
Universal model QCPU	Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, Q26UDEHCPU

Remark

This manual does not describe any functions other than the functions of CPU module using Ethernet communication. For details of functions other than the functions of CPU module using Ethernet communication, refer to the following manual.

☞ QnUCPU User's Manual (Function Explanation, Program Fundamentals)

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MANUALS

To understand the main specifications, functions, and usage of the CPU module, refer to the basic manuals.
Read other manuals as well when using a different type of CPU module and its functions.
Order each manual as needed, referring to the following list.

The numbers in the "CPU module" and the respective modules are as follows.

Number	CPU module
1)	Basic model QCPU
2)	High Performance model QCPU
3)	Process CPU
4)	Redundant CPU
5)	Universal model QCPU

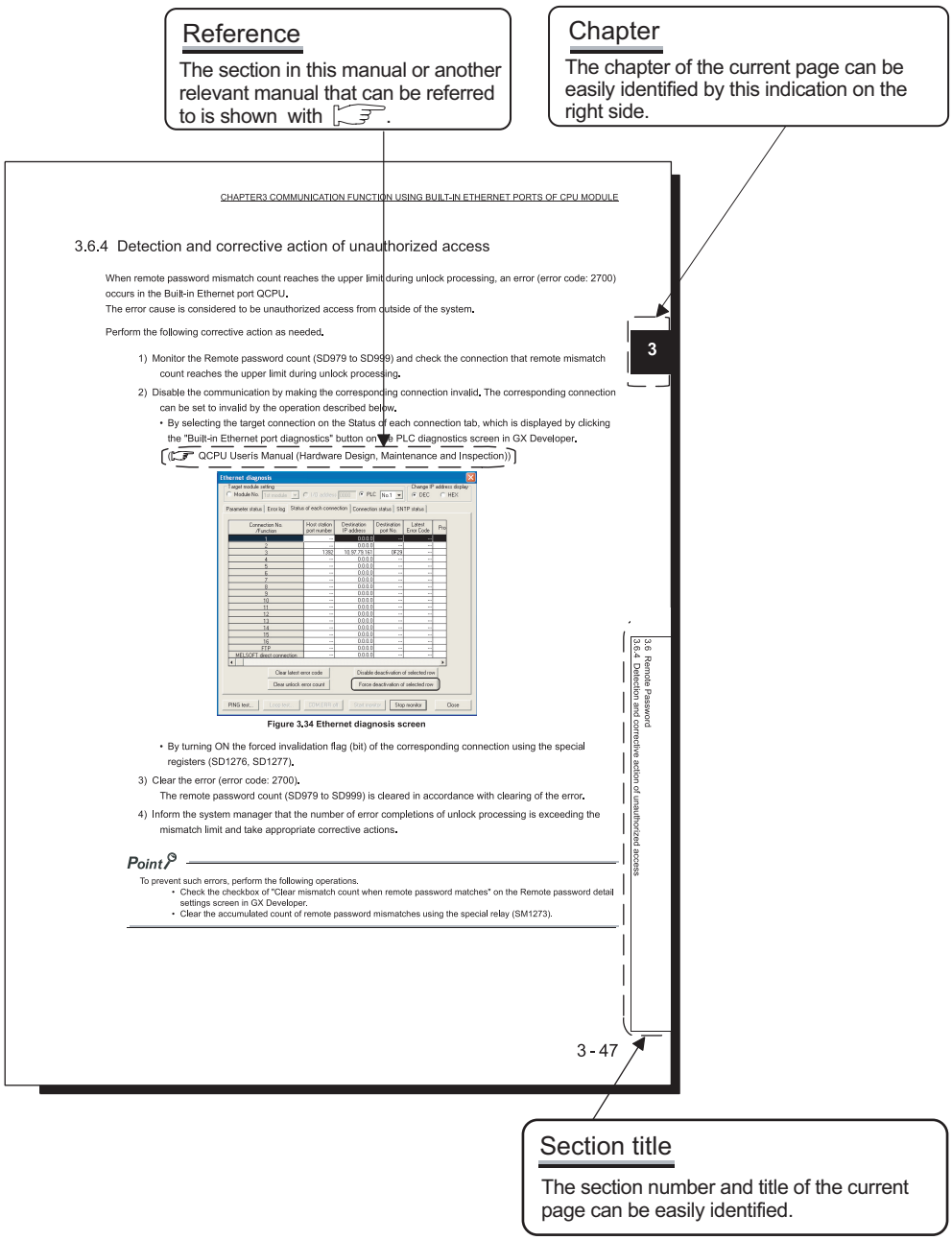
●: Basic manual ○: Other CPU module manuals

Manual name < Manual number (model code) >	Description	CPU module				
		1)	2)	3)	4)	5)
■ Userís manual						
QCPU Userís Manual (Hardware Design, Maintenance and Inspection) < SH-080483ENG (13JR73) >	Specifications of the hardware (CPU modules, power supply modules, base units, extension cables, and memory cards), system maintenance and inspection, troubleshooting, and error codes	●	●	●	●	●
QnUCPU Userís Manual (Function Explanation, Program Fundamentals) < SH-080807ENG (13JZ27) >	Functions, methods, and devices for programming					●
Qn(H)/QnPH/QnPRHCPU Userís Manual (Function Explanation, Program Fundamentals) < SH-080803ENG (13JZ28) >	Functions, methods, and devices for programming	●	●	●	●	
QCPU Userís Manual (Multiple CPU System) < SH-080485ENG (13JR75) >	Information for configuring a multiple CPU system (system configuration, I/O numbers, communication between CPU modules, and communication with the input/output modules and intelligent function modules)	○	○	○		○
QnPRHCPU Userís Manual (Redundant System) < SH-080486ENG (13JR76) >	Redundant system configuration, functions, communication with external devices, and troubleshooting				○	
QCPU Userís Manual (Communication via Built-in Ethernet Port) < SH-080811ENG (13JZ29) >	Functions of communication via a Ethernet port built in a CPU module					○
■ Programming manual						
QCPU Programming Manual (Common Instructions) < SH-080809ENG (13JW10) >	How to use sequence instructions, basic instructions, and application instructions	●	●	●	●	●
QCPU (Q Mode)/QnACPU Programming Manual (SFC) < SH-080041 (13JF60) >	System configuration, performance specifications, functions, programming, debugging, and error codes for SFC (MELSAP3) programs	○	○	○	○	○
QCPU (Q Mode) Programming Manual (MELSAP-L) < SH-080076 (13JF61) >	Programming methods, specifications, and functions for SFC (MELSAP-L) programs	○	○	○	○	○
QCPU (Q Mode) Programming Manual (Structured Text) < SH-080366E (13JF68) >	Programming methods using structured languages	○	○	○	○	○
QCPU (Q Mode) / QnACPU Programming Manual (PID Control Instructions) < SH-080040 (13JF59) >	Dedicated instructions for PID control	○	○		○	○

Manual name < Manual number (model code) >	Description	CPU module				
		1)	2)	3)	4)	5)
QnPHCPU/QnPRHCPU Programming Manual (Process Control Instructions) < SH-080316E (13JF67) >	Dedicated instructions for process control			○	○	

Other relevant manuals

Manual name	Description
CC-Link IE Controller Network Reference Manual < SH-080668ENG (13JV16) >	Specifications, procedures and settings before system operation, parameter setting, programming, and troubleshooting of the CC-Link IE controller network module
Q Corresponding MELSECNET/H Network System Reference Manual (PLC to PLC network) < SH-080049 (13JF92) >	Specifications, procedures and settings before system operation, parameter setting, programming, and troubleshooting of a MELSECNET/H network system (PLC to PLC network)
Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O network) < SH-080124 (13JF96) >	Specifications, procedures and settings before system operation, parameter setting, programming, and troubleshooting of a MELSECNET/H network system (remote I/O network)
Q Corresponding Ethernet Interface Module Userís Manual (Basic) < SH-080009 (13JL88) >	Specifications, procedures for data communication with external devices, line connection (open/close), fixed buffer communication, random access buffer communication, and troubleshooting of the Ethernet module
Q Corresponding Ethernet Interface Module Userís Manual (Application) < SH-080010 (13JL89) >	E-mail function, programmable controller CPU status monitoring function, communication via MELSECNET/H or MELSECNET/10, communication using the data link instructions, and file transfer function (FTP server) of the Ethernet module
CC-Link System Master/Local Module Userís Manual < SH-080394E (13JR64) >	System configuration, performance specifications, functions, handling, wiring, and troubleshooting of the QJ61BT11N
Q Corresponding Serial Communication Module Userís Manual (Basic) < SH-080006 (13JL86) >	Overview, system configuration, specifications, procedures before operation, basic data communication method with external devices, maintenance and inspection, and troubleshooting for using the serial communication module
Q Corresponding Serial Communication Module Userís Manual (Application) < SH-080007 (13JL87) >	Special functions (specifications, usage, and settings and data communication method with external devices of the serial communication module
Q Corresponding MELSEC Communication Protocol Reference Manual < SH-080008 (13JF89) >	Communication method using the MC protocol, which reads/writes data to/from the CPU module via the serial communication module or Ethernet module
GX Developer Version 8 Operating Manual < SH-080373E (13JU41) >	Operating methods of GX Developer, such as programming and printout


Reference
The section in this manual or another relevant manual that can be referred to is shown with .
Chapter
The chapter of the current page can be easily identified by this indication on the right side.
CHAPTER3 COMMUNICATION FUNCTION USING BUILT-IN ETHERNET PORTS OF CPU MODULE
3.6.4 Detection and corrective action of unauthorized access
When remote password mismatch count reaches the upper limit during unlock processing, an error (error code: 2700) occurs in the Built-in Ethernet port QCPU.
The error cause is considered to be unauthorized access from outside of the system.
Perform the following corrective action as needed.
1) Monitor the Remote password count (SD979 to SD999) and check the connection that remote mismatch count reaches the upper limit during unlock processing.
2) Disable the communication by making the corresponding connection invalid. The corresponding connection can be set to invalid by the operation described below.
• By selecting the target connection on the Status of each connection tab, which is displayed by clicking the "Built-in Ethernet port diagnostics" button on the PLC diagnostics screen in GX Developer.
(QCPU User's Manual (Hardware Design, Maintenance and Inspection))
Figure 3.34 Ethernet diagnosis screen
• By turning ON the forced invalidation flag (bit) of the corresponding connection using the special registers (SD1276, SD1277).
3) Clear the error (error code: 2700).
The remote password count (SD979 to SD999) is cleared in accordance with clearing of the error.
4) Inform the system manager that the number of error completions of unlock processing is exceeding the mismatch limit and take appropriate corrective actions.
Point
To prevent such errors, perform the following operations.
• Check the checkbox of "Clear mismatch count when remote password matches" on the Remote password detail settings screen in GX Developer.
• Clear the accumulated count of remote password mismatches using the special relay (SM1273).
3
3.6 Remote Password
3.6.4 Detection and corrective action of unauthorized access
3 - 47
Section title
The section number and title of the current page can be easily identified.

In addition, this manual uses the following types of explanations.

Point

In addition to description of the page, notes or functions that require special attention are described here.

Remark

The reference related to the page or useful information are described here.

GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, this manual uses the following generic terms and abbreviations.

* indicates a part of the model or version.

(Example) : Q33B, Q35B, Q38B, Q312B → Q3□B

Generic term/abbreviation	Description
■ Series	
Q series	Generic term for Mitsubishi MELSEC-Q series programmable controller
■ CPU module type	
CPU module	Generic term for the Basic model QCPU, High Performance model QCPU, Process CPU, Redundant CPU, Universal model QCPU
Universal model QCPU	Generic term for the Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q10UDHCPU, Q13UDHCPU, Q20UDHCPU, Q26UDHCPU, Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, and Q26UDEHCPU
Built-in Ethernet port QCPU	Generic term for the Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, and Q26UDEHCPU
■ CPU module model	
QnUCPU	Generic term for the Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q10UDHCPU, Q13UDHCPU, Q20UDHCPU, Q26UDHCPU, Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, and Q26UDEHCPU
QnUDE(H)CPU	Generic term for the Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, and Q26UDEHCPU
■ Others	
GX Developer	Product name for SW□D5C-GPPW-E GPP function software package compatible with the Q series
GOT	Generic term for Mitsubishi Graphic Operation Terminal, GOT-A*** series, GOT-F*** series, and GOT1000 series

CHAPTER1 OVERVIEW

1.1 Features

The features specific to the Built-in Ethernet port QCPU are described below.

(1) GX Developer/GOT connection (☞ Section 3.1)

- The Find CPU function makes it possible to find the Built-in Ethernet port QCPU connected to the same hub as GX Developer and displays a list.
- MELSOFT connection allows access to CPU modules on the network, such as internal LAN, via routers.

(2) GX Developer direct connection (simple connection) (☞ Section 3.2)

When connecting the Built-in Ethernet port QCPU with GX Developer, the direct connection (simple connection), which connects them using only one Ethernet cable (not using a hub) is available. The direct connection enables communication with only specifying connection target. IP address setting is not required.

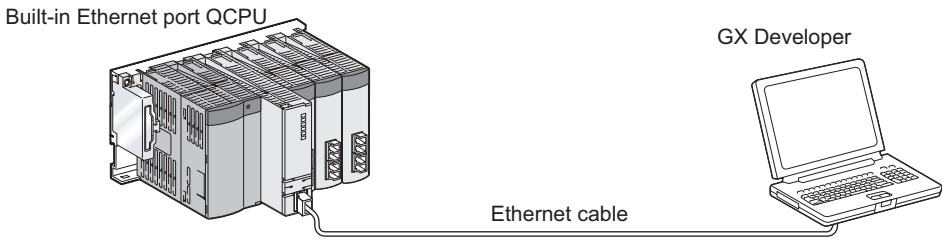


Figure 1.1 Direct connection (simple connection)

(3) MC protocol communication (☞ Section 3.3)

External devices such as personal computers and display devices read/write device data from/to the Built-in Ethernet port QCPU. This enables external devices to monitor the operation of the CPU module, analyze data, and manage production.

(4) Time setting function (SNTP client) (☞ Section 3.4)

- The time setting function enables automatic time setting for the Built-in Ethernet port QCPU, resulting in reducing the maintenance cost for time setting.
- By synchronizing the Built-in Ethernet port QCPU connected via Ethernet, error occurrence order for each process can be checked and troubleshooting becomes easy.
- Since time setting can be performed automatically at programmable controller CPU power ON, the CPU module can start operation with accurate time data.

(5) File transfer function (FTP) (☞ Section 3.5)

An external device with a FTP client function can read/write files from/to the Built-in Ethernet port QCPU in units of files, so that data such as in the program file and/or file register can be transferred easily.

(6) Remote password (☞ Section 3.6)

The Built-in Ethernet port QCPU can prevent unauthorized access from outside of the system and enhance the security by setting the remote password.

CHAPTER2 COMMUNICATION SPECIFICATIONS

Table2.1 shows the communication specifications for built-in Ethernet ports of the CPU module.

Table2.1 Ethernet communication specifications

Item			Specifications
Transmission specifications	Data transfer speed		100/10Mbps
	Communication mode		Full-duplex/Half-duplex
	Transmission method		Base band
	Maximum distance between hub and node		100m (328.08feet)
	Maximum number of nodes/ connections	10BASE-T	Cascade connection: Four stages at maximum
		100BASE-TX	Cascade connection: Two stages at maximum
Number of connections	TCP/IP		16 for MELSOFT connections and MC protocols, 1 for FTP
	UDP/IP		
Cable used*1	10BASE-T		Ethernet-compliant cable Category 3 or more (STP/UTP cable)*2
	100BASE-TX		Ethernet-compliant cable Category 5 or more (STP cable)

*1 : Straight cables can be used.
Crossing cables can also be used for connecting the Built-in Ethernet port QCPU with GOT directly using an Ethernet cable.

*2 : STP cables are recommended for the use under noisy environment.

Hubs with 10BASE-T or 100BASE-TX ports*3 can be used.
The maximum number of devices that can access to one CPU module simultaneously is 16.

*3 : The ports must comply with the IEEE802.3 10BASE-T or IEEE802.3 100BASE-TX standards.

Point

- When connecting with a hub, the Built-in Ethernet port QCPU determines the cable used (10BASE-T or 100BASE-TX) and the communication mode (full-duplex or half-duplex).
  Set the communication mode to the half-duplex mode on the hub side when the hub that does not have the auto-negotiation function is used.
- The module operation is not guaranteed if any of the following connection is used.
  Check the module operation on the user side.
  - Connections using the Internet (general public line) (Connections using Internet connection service provided by Internet service providers and telecommunications carriers)
  - Connections using devices in which a firewall is installed
  - Connections using broadband routers
  - Connections using wireless LAN

CHAPTER3 COMMUNICATION FUNCTION VIA BUILT-IN ETHERNET PORTS OF CPU MODULE

The Built-in Ethernet port QCPU can communicate data by connecting built-in Ethernet ports of the CPU module with personal computers and/or display devices using an Ethernet cable (100BASE-TX, 10BASE-T).

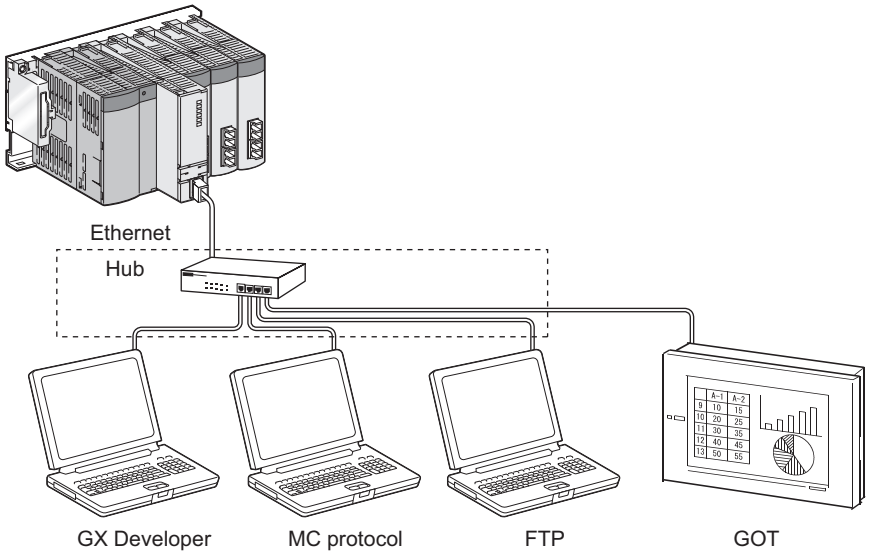


Figure 3.1 Connection example using built-in Ethernet ports of CPU module

For the comparison with the conventional MELSEC-Q series Ethernet module (QJ71E71-100), refer to Appendix 1.

The following table lists the functions using built-in Ethernet ports of the CPU module.

Table3.1 List of functions

Function	Reference
GX Developer/GOT connection	Section 3.1
GX Developer direct connection (simple connection)	Section 3.2
MC protocol communication	Section 3.3
Time setting function (SNTP client)	Section 3.4
File transfer function (FTP server)	Section 3.5
Remote password	Section 3.6

3.1 GX Developer/GOT Connection

The following describes the setting method for connecting the Built-in Ethernet port QCPU with GX Developer and/or GOT

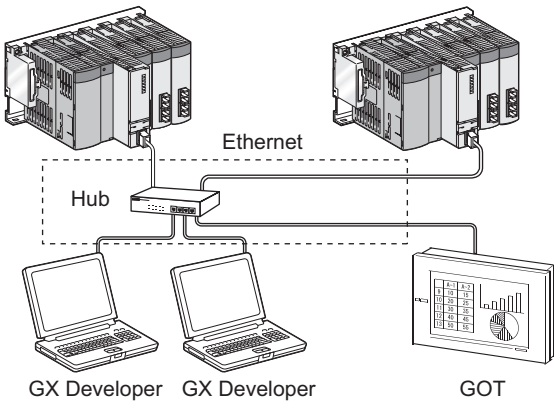


Figure 3.2 Connection example using hub

Point

- The Built-in Ethernet port QCPU can be connected directly with GX Developer using one Ethernet cable. (Direct connection (simple connection))
  The direct connection (simple connection) enables the QnUDE(H)CPU and GX Developer to communicate without setting IP addresses. For details, refer to Section 3.2.
- For setting on the GOT side, refer to following manual.
  ☞ GOT1000 Series Connection Manual

3.1.1 Setting for CPU module

The setting for the CPU module is described below.

(1) PLC parameter setting

Set the items in the Built-in Ethernet port tab of the PLC parameter dialog box as shown in Figure 3.3.

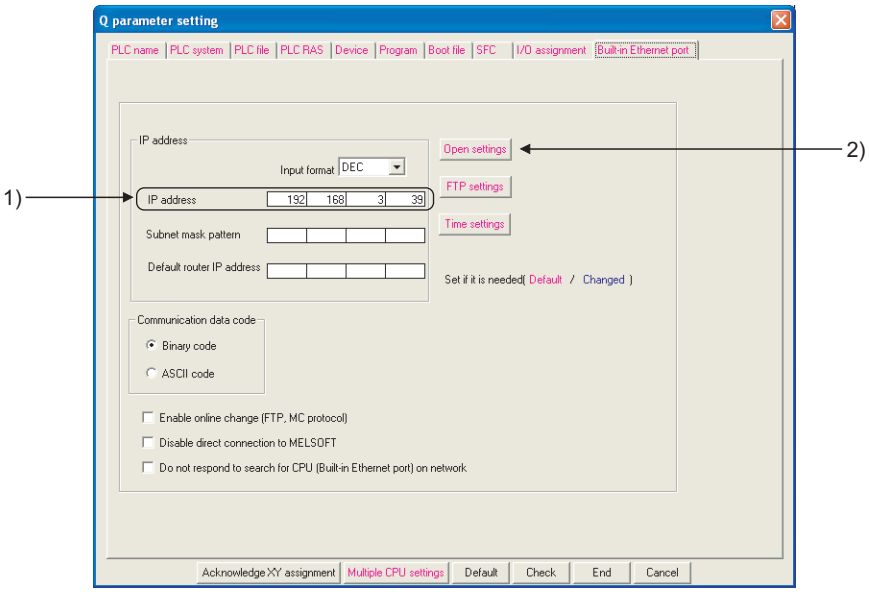


Figure 3.3 Built-in Ethernet port tab

1) Set the CPU module IP address.

2) Set the connection for GX Developer (MELSOFT connection). (Refer to Figure 3.4)

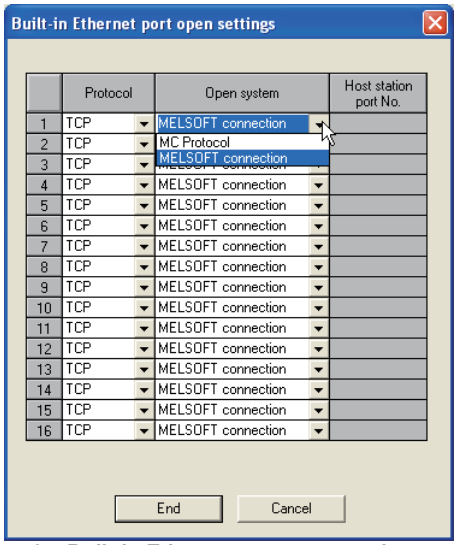


Figure 3.4 Built-in Ethernet port open settings screen

- Protocol : Select the protocol to be used, "TCP" or "UDP" in accordance with the external device. Select "TCP" to emphasize communication reliability.
- Open system : Select "MELSOFT connection". (For the MELSOFT connection, refer to Section 3.3.)
- Host station port No. :Set the number when "MC Protocol" is selected.

(2) Operation for validating parameters

Using Ethernet direct connection or USB connection, write the settings in PLC parameter to the CPU module by selecting [Online] → [Write to PLC] in GX Developer. After writing the parameter settings, power the programmable controller OFF → ON or perform the reset operation of the CPU module using the RUN/STOP/RESET switch so that the parameters become valid.
For the Ethernet direct connection, refer to the following section.
(☞ Section 3.2)

Point

For the reset operation using the RUN/STOP/RESET switch, refer to the following manual.
☞ QCPU Userís Manual (Hardware Design, Maintenance and Inspection)

3.1.2 Setting on GX Developer side

Setting on GX Developer side is described below.

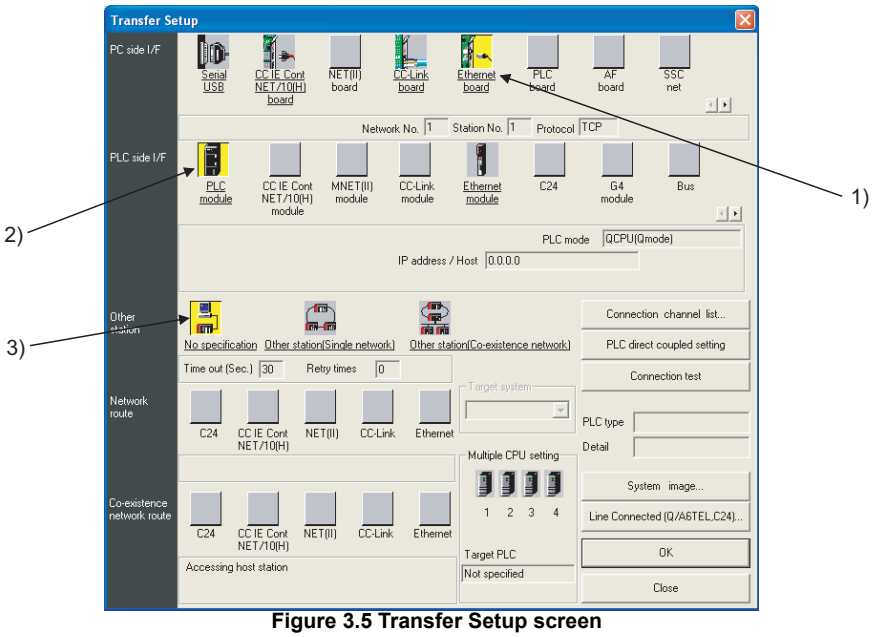


Figure 3.5 Transfer Setup screen

1) Select "Ethernet board" for "PC side I/F".

Select a protocol to be used in the Ethernet board setting screen as shown in Figure 3.6.

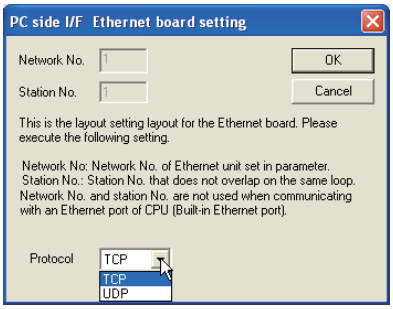

PC side I/F Ethernet board setting
Network No. 1
Station No. 1
OK
Cancel
This is the layout setting layout for the Ethernet board. Please execute the following setting.
Network No: Network No. of Ethernet unit set in parameter.
Station No.: Station No. that does not overlap on the same loop.
Network No. and station No. are not used when communicating with an Ethernet port of CPU (Built-in Ethernet port).
Protocol
TCP
TCP
UDP

Figure 3.6 PC side I/F Ethernet board setting screen

- Network No., Station No.: Not used.
- Protocol: Select the protocol to be used, "TCP" or "UDP".
  (Select the same protocol which has been set under the Open settings at Section 3.1.1.)

2) Select "PLC module" for "PLC side I/F".

Enter the IP address or host name of the CPU module in the Detailed setting of PLC module screen as shown in Figure 3.7.

(For the host name, enter the name set in Microsoft® or Windows® hosts files.)

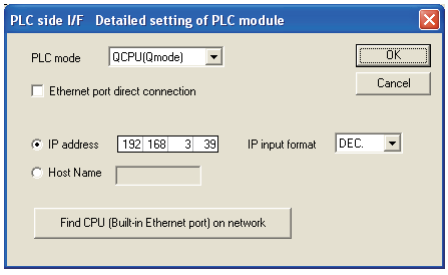

PLC side I/F Detailed setting of PLC module
PLC mode QCPU(Qmode)
OK
Cancel
Ethernet port direct connection
IP address 192 168 3 39
IP input format DEC.
Host Name
Find CPU (Built-in Ethernet port) on network

Figure 3.7 PLC side I/F Detailed setting of PLC module screen

3) Make the setting for "Other station".

Point

The Find CPU function can be used for specifying the CPU IP address in the connection using a hub.
This function can be activated on the PLC side I/F Detailed setting of PLC module screen, finds the CPU modules connected to the same hub as GX Developer, and displays a list.

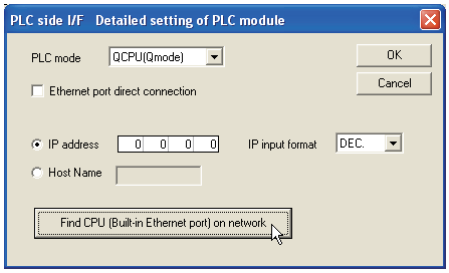


Figure 3.8 PLC side I/F Detailed setting of PLC module screen

A list of the CPU modules found is displayed.

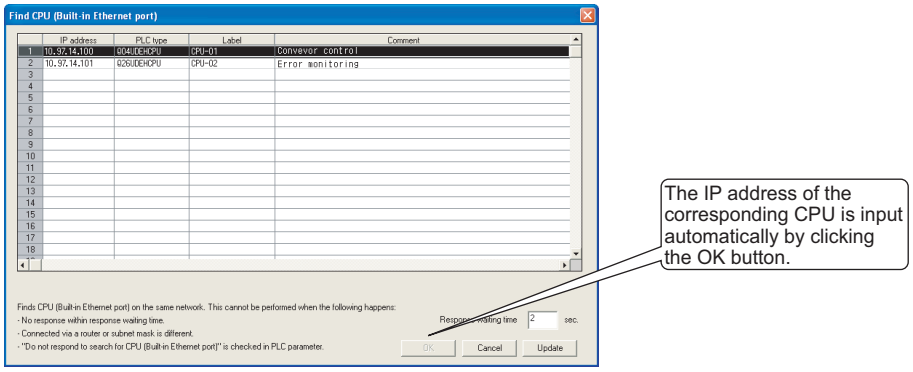


Figure 3.9 Find CPU (Built-in Ethernet port) screen

- CPU modules connected to a cascade connected hub are also found and displayed in the list.
- CPU modules connected via a router cannot be found.
- CPU modules connected via wireless LAN may not be found since the Ethernet communication does not stabilize due to lost packets.
- If CPU modules with same IP address are found in the list, re-examine the parameter settings of the CPU IP address. If communication is performed with the situation left as is, a communication error occurs.
- CPU modules may not be found if service processing load on CPU modules is heavy.
  In that case, extend the response waiting time in the Find CPU (Built-in Ethernet port) screen as shown above, or extend the service processing time in the PLC parameter dialog box.
- Select the checkbox as shown in Figure 3.10 in the Built-in Ethernet port tab of the PLC parameter dialog box so that CPU modules to be searched do not respond on the network.

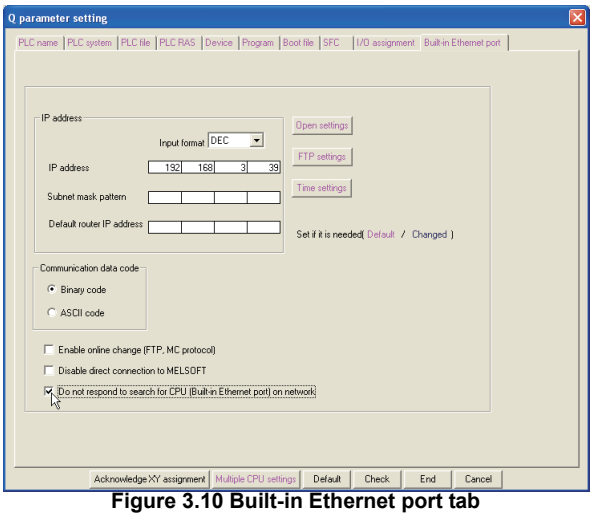


Figure 3.10 Built-in Ethernet port tab

3.1.3 Precautions

The following are the precautions must be taken when connecting the Built-in Ethernet port QCPU with GX Developer or GOT.

(1) Existence check using the KeepAlive function

When the protocol is set to "TCP", existence check using the KeepAlive function is performed.
The CPU module sends an existence check message five seconds after the last message from the external device is received and waits to see whether a response from the external device is received.
If there is no response, the CPU module keeps sending an existence check message in five-second intervals.
When a response has not been confirmed within 45 seconds, the connection is disconnected, considering that no external device exists.
The connection may be disconnected if the external device does not support the TCP KeepAlive function (response to ACK messages for KeepAlive).

(2) Number of connections exceeding setting range

Establish connections within the number of protocols set for open settings of PLC parameter.
If TCP connections exceeding the set number of connections are made with a personal computer, the status of some applications may change as described below.

- The status of application may change into the wait status, making the application inoperable.
- The time period causing a time-out error may increase.

(3) Retransmission processing in TCP connection

In TCP connection, if no ACK response message for TCP protocol is received from the external device, retransmission processing is performed.
Resend processing is performed six times, 0.3, 0.6, 1.2, 2.4, 4.8, and 9.6 seconds after the first message.
If there is no ACK response within a period of 19.2 seconds after the last message is resent, the connection is disconnected, considering that the external device is not operating normally.
(The connection is disconnected within the total period of 38.1 seconds.)

(4) Communication with MELSOFT devices in UDP protocol

To communicate with multiple MELSOFT devices using the UDP protocol, set the same number of protocols as MELSOFT devices in PLC parameter.

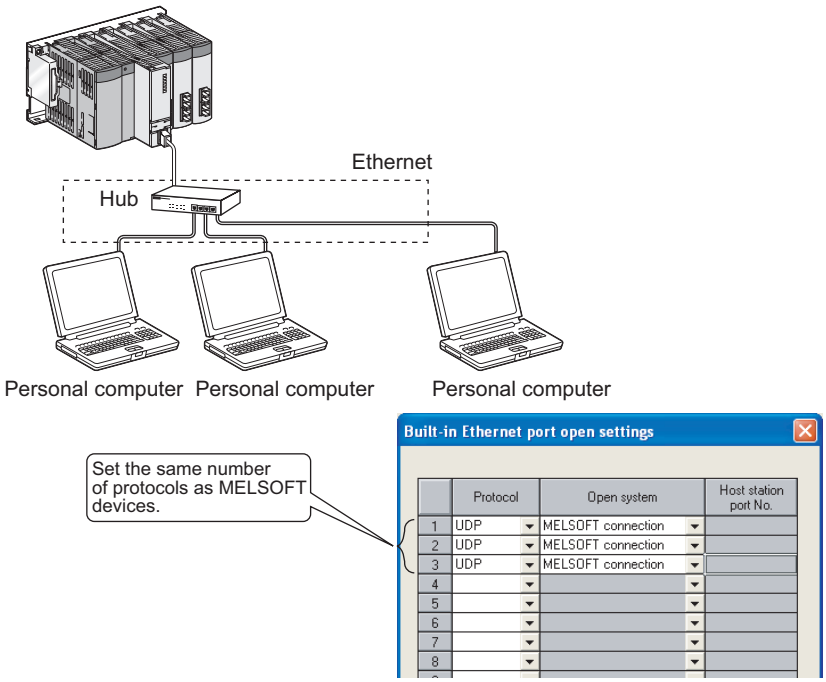


Figure 3.11 Setting for MELSOFT connection using UDP protocol

(5) Sampling trace

When the sampling trace function is executed using GX Developer which is connected with built-in Ethernet ports of the CPU module, stop the function before powering OFF the programmable controller or resetting the CPU module.

(6) Remote STOP or remote PAUSE

To execute the remote STOP or remote PAUSE to a CPU module on another station using GX Developer which is connected with built-in Ethernet ports of the CPU module, execute the remote STOP or remote PAUSE before powering OFF the programmable controller or resetting the CPU module.

3.1.4 Communication via routers

MELSOFT connection allows access to CPU modules on the network, such as internal LAN, via routers.

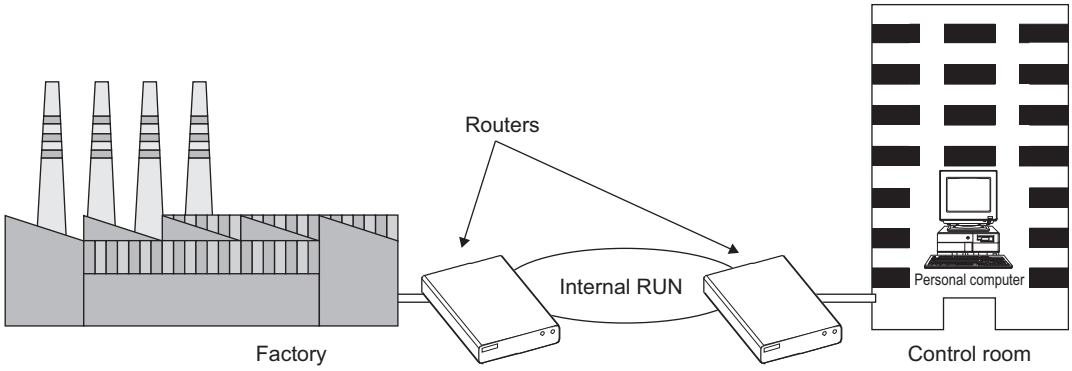


Figure 3.12 Example of router use

When accessing a CPU module via routers, set the items in parameter as shown in Figure 3.13.
For other settings, refer to Section 3.1.1.

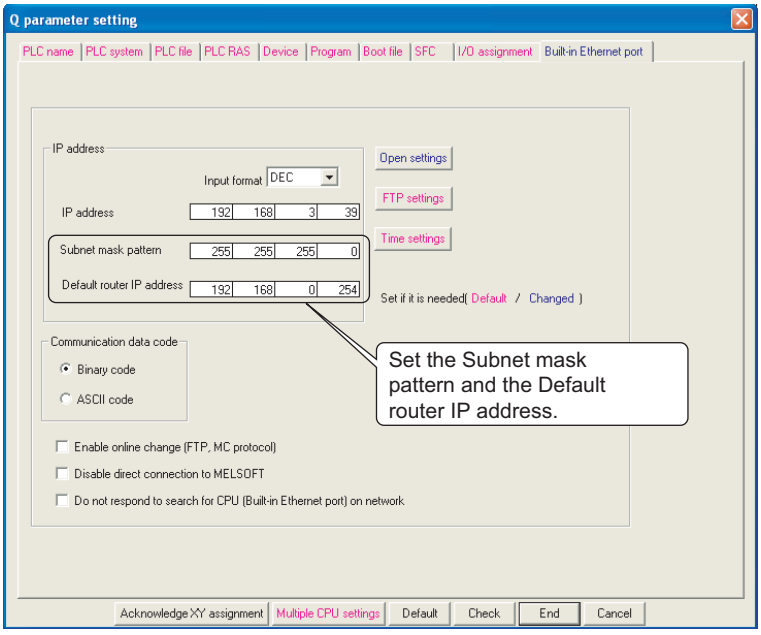


Figure 3.13 Built-in Ethernet port tab

3.2 GX Developer Direct Connection (Simple Connection)

When connecting the Built-in Ethernet port QCPU with GX Developer, the direct connection (simple connection), which connects them using only one Ethernet cable (not using a hub) is available.
The direct connection enables communication with only specifying connection target (Broadcasting). IP address setting is not required.

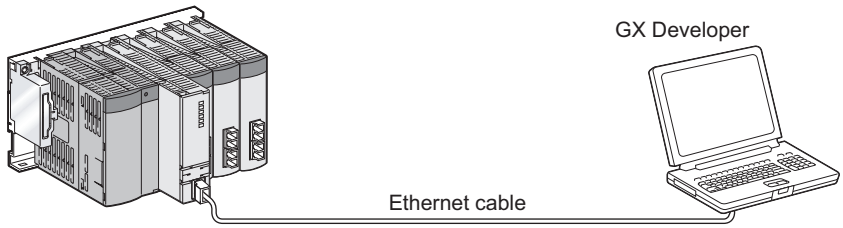


Figure 3.14 Direct connection (simple connection)

Point

When directly connecting the Built-in Ethernet port QCPU with GX Developer using an Ethernet cable, the wired cable is longer than when using a USB cable. Therefore, the Built-in Ethernet port QCPU can be connected with a device located at distant locations improperly.
Unauthorized connection to the Built-in Ethernet port QCPU can be prevented by selecting the checkbox as shown in Figure 3.15 in the Built-in Ethernet port tab of the PLC parameter dialog box.

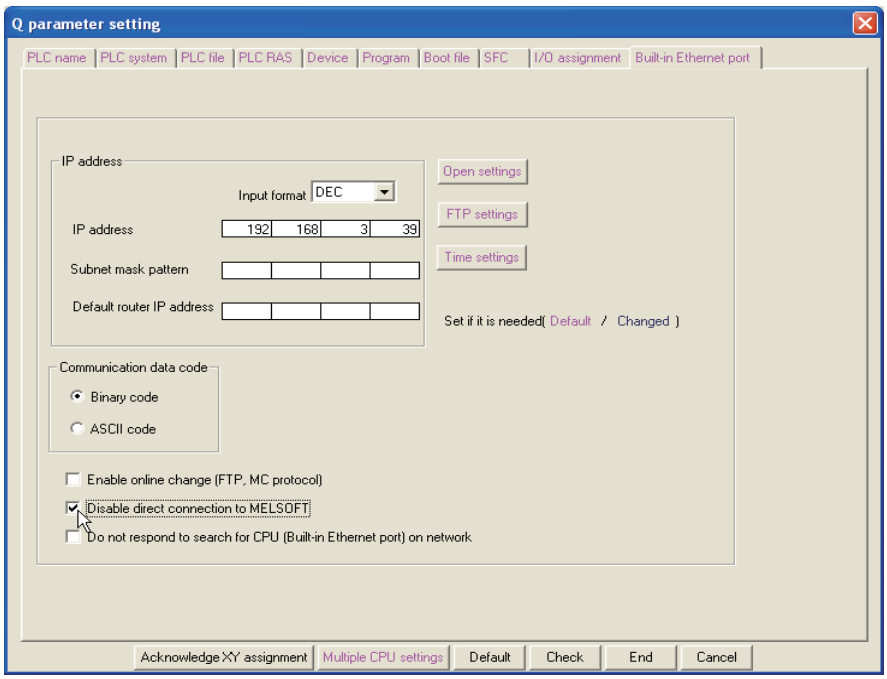


Figure 3.15 Setting for preventing direct connection

3.2.1 Communication setting in GX Developer

Set the items on the Transfer Setup screen in GX Developer as shown in Figure 3.16.

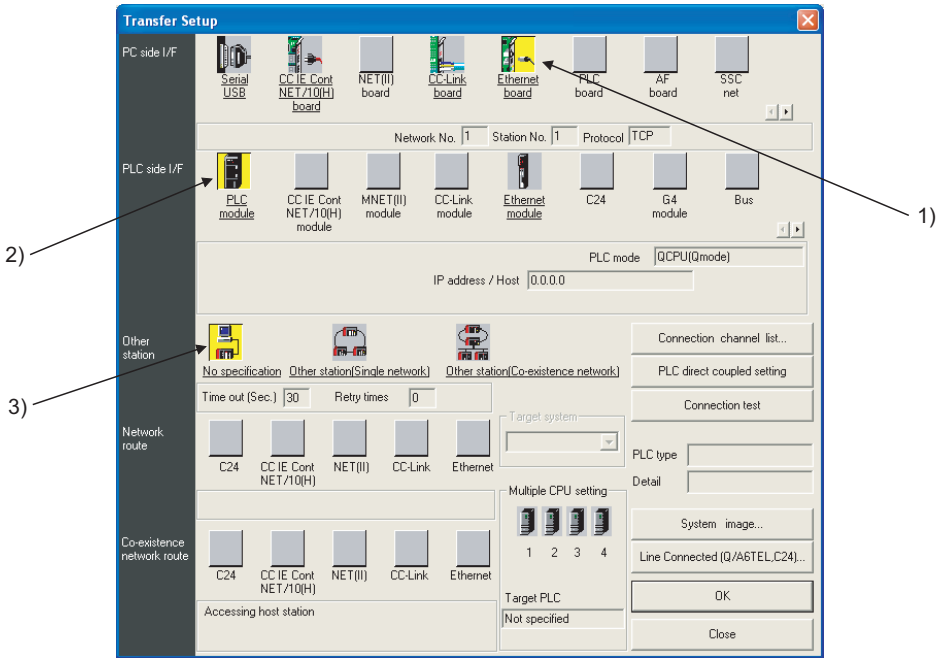


Figure 3.16 Transfer Setup screen

1) Select "Ethernet board" for "PC side I/F".

2) Select "PLC module" for "PLC side I/F".

Check the "Ethernet port direct connection" checkbox on the detailed setting screen as shown in Figure 3.17.

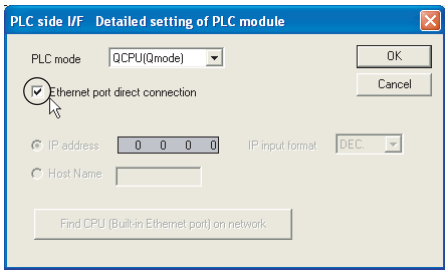

PLC side I/F Detailed setting of PLC module
PLC mode QCPU(Qmode)
OK
Cancel
Ethernet port direct connection
IP address 0 0 0 0
IP input format DEC
Host Name
Find CPU (Built-in Ethernet port) on network

Figure 3.17 PLC side I/F Detailed setting of PLC module screen

3) Make the setting for "Other station".

3.2.2 Precautions

The following are the precautions must be taken when directly connecting the Built-in Ethernet port QCPU with GX Developer.

(1) Connection to LAN line

When the CPU module is connected to LAN line, do not perform communication using direct connection. If performed, the communication may put a load to LAN line and adversely affect communications of other devices.

(2) Indirect connection

Do not select the "Ethernet port direct connection" checkbox in the Detailed setting of PLC module screen in the system configuration that connects a Built-in Ethernet port QCPU with an external device using a hub as shown in Figure 3.18.

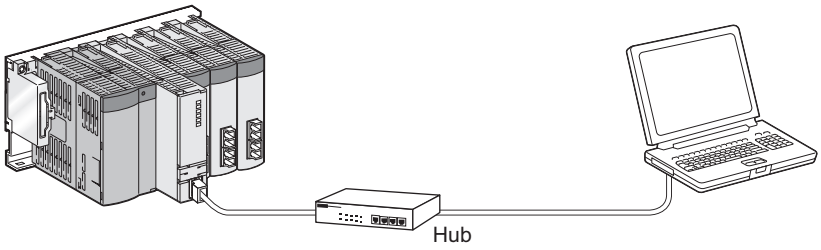


Figure 3.18 Non-direct connection

(3) Conditions that disallow direct connection

Under the following conditions, direct connection communication may not be available. In that case, check the setting of the CPU module and/or personal computer.

1) In the CPU module IP address, bits corresponding to "0" in the personal computer subnet mask are all ON or all OFF.

Example	CPU module IP address	: 64. 64. 255. 255
	Personal computer IP address	: 64. 64. 1. 1
	Personal computer subnet mask	: 255. 255. 0. 0

2) In the CPU module IP address, bits corresponding to the host address for each class in the personal computer IP address are all ON or all OFF.

Example	CPU module IP address	: 64. 64. 255. 255
	Personal computer IP address	: 192. 168. 0. 1
	Personal computer subnet mask	: 255. 0. 0. 0

Remark

- The IP addresses for each class are described below.
  Class A :0.x.x.x to 127.x.x.x Class B :128.x.x.x to 191.x.x.x Class C :192.x.x.x to 223.x.x.x
- The host addresses for each class are described below.
  Class A :255. 0. 0. 0 Class B :255.255. 0. 0 Class C :255.255.255. 0

3.3 MC Protocol Communication

Built-in Ethernet ports of the Built-in Ethernet port QCPU enable communication using the MC protocol*1.
External devices such as personal computers and display devices read/write device data from/to the CPU module using the MC protocol.
External devices monitor the operation of the CPU module, analyze data, and manage production by reading/writing device data.
Besides, the remote password function can prevent unauthorized access to the CPU module from outside of the system.(☞ Section 3.6)

*1 : The MC protocol is an abbreviation for the MELSEC communication protocol.
The MELSEC communication protocol is a name of the communication method used to access CPU modules from external devices in accordance with the communication procedure of Q series programmable controllers (such as serial communication modules, Ethernet modules).
For details on the MC protocol, refer to the following manual.
☞ Q Corresponding MELSEC Communication Protocol Reference Manual

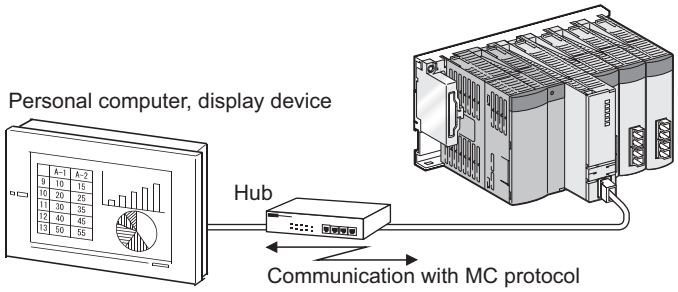


Figure 3.19 MC protocol communication

Point

External devices such as personal computers and display devices can communicate with only the connected CPU module using the MC protocol.
An access to any of the following CPU modules is not available.

- CPU modules on another station via network
- Other CPU modules in a multiple CPU system

3.3.1 Setting for MC protocol communication

Setting for communication using the MC protocol is described below.

Set the items of following (a) to (c) in the Built-in Ethernet port tab of the PLC parameter dialog box.

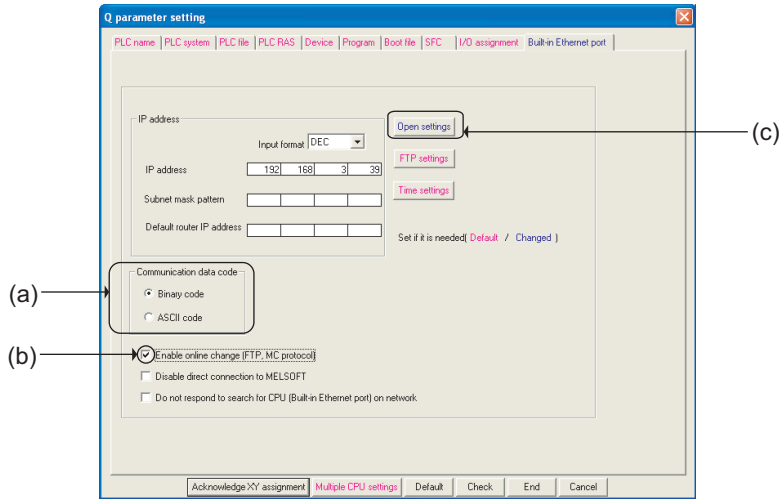


Figure 3.20 Built-in Ethernet port tab

(a) Communication data code

Select a communication data code used for the MC protocol, "Binary code" or "ASCII code".

(b) Enable online change (FTP, MC protocol)

Check the checkbox to enable online change when writing data to the CPU module from the external device that communicates using the MC protocol.

For details on the available functions with this setting, refer to Section 3.3.2.

(c) Open settings

- Protocol :Select a connection used as MC protocol. (Up to 16 CPU modules can be connected.)
- Open system : Select "MC protocol".
- Host station port No. : Set the host station port number (in hexadecimal). (Required)
  (Setting range : 0401H to 1387H, 1392H to FFFEH)

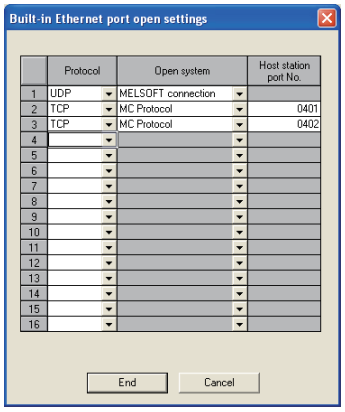


Figure 3.21 Open settings screen

Point

When the "Enable online change (FTP, MC protocol)" box is unchecked, if a data write request is sent from an external device to the CPU module which is in the RUN status, data will not be written to the CPU module and the module returns the NAK message.

3.3.2 Command list

When the Built-in Ethernet port QCPU communicates using the MC protocol, commands listed in Table3.2 can be executed.

Table3.2 List of MC protocol commands supported in MC protocol communication function of Built-in Ethernet port QCPU

Function			Command (Subcommand)*1	Description	Number of processed points	Status of CPU module		
						STOP	RUN	
							Write enabled	Write disabled
Device memory	Batch read	In units of bits	0401 (0001)	Reads bit devices in units of one point.	ASCII: 3584 points BIN: 7168 points	○	○	○
		In units of words	0401 (0000)	Reads bit devices in units of 16 points.	960 words (15360 points)			
				Reads word devices in units of one point.	960 points			
	Batch write	In units of bits	1401 (0001)	Writes bit devices in units of one point.	ASCII: 3584 points BIN: 7168 points	○	○	×
		In units of words	1401 (0000)	Writes bit devices in units of 16 points.	960 words (15360 points)			
				Writes word devices in units of one point.	960 points			
	Random read *2	In units of words	0403 (0000)	Reads bit devices in units of 16 or 32 points by randomly specifying a device or device number.	192 points	○	○	○
				Reads word devices in units of one or two points by randomly specifying a device or device number.				
	Test (Random write)	In units of bits	1402 (0001)	Sets/resets bit devices in units of one point by randomly specifying a device or device number.	188 points	○	○	×
		In units of words *2	1402 (0000)	Sets/resets bit devices in units of 16 or 32 points by randomly specifying a device or device number.	*5			
				Writes word devices in units of one or two points by randomly specifying a device or device number.				
	Monitor registration *2*3*4	In units of words	0801 (0000)	Registers bit devices to be monitored in units of 16 or 32 points.	192 points	○	○	○
				Registers word devices to be monitored in units of one or two points.				
	Monitor	In units of words	0802 (0000)	Monitors devices registered.	Number of registered points	○	○	○
Remote password	Unlock		1630 (0000)	Specifies the remote password and changes the status from locked to unlocked.	---	○	○	○
	Lock		1631 (0000)	Specifies the remote password and changes the status from unlocked to locked.	---	○	○	○

○: Available, ×: Not available

*1 : Subcommand is for the QnA-compatible 3E frame.

*2 : Devices such as TS, TC, SS, SC, CS, and CC cannot be specified in units of words.
For the monitor registration, an error (4032H) occurs during the monitor operation.

*3 : During monitor registration, monitor condition cannot be set.

*4 : Do not execute monitor registration from multiple external devices. If executed, the last monitor registration becomes valid.

*5 : Set the number of processed points so that the following condition is satisfied.
(Number of word access points) × 12 + (Number of double-word access points) × 14 ≦ 1920

- Bit devices are regarded as 16 bits during word access and 32 bits during double-word access.
- Word devices are regarded as one word during word access and two words during double-word access.

3.3.3 Available devices

Table3.3 lists the devices available in commands used in the MC protocol communication function.

Table3.3 List of available devices in Built-in Ethernet port QCPU

Classification	Device		Device code	Device number range(Default)		Remarks
Internal system device	Special relay		SM	000000 to 002047	Decimal	---
	Special register		SD	000000 to 002047	Decimal	
internal user device	Input		X	000000 to 001FFF	Hexadecimal	
	Output		Y	000000 to 001FFF	Hexadecimal	
	Internal relay		M	000000 to 008191	Decimal	• When the device number range is changed, access is possible up to the largest device number after the change. • Local devices cannot be accessed.
	Latch relay		L	000000 to 008191	Decimal	
	Annunciator		F	000000 to 002047	Decimal	
	Edge relay		V	000000 to 002047	Decimal	
	Link relay		B	000000 to 001FFF	Hexadecimal	
	Data register		D	000000 to 012287	Decimal	
	Link register		W	000000 to 001FFF	Hexadecimal	
	Timer	Contact	TS	000000 to 002047	Decimal	
		Coil	TC			
		Current value	TN			
	Retentive timer	Contact	SS	000000 to 002047	Decimal	
		Coil	SC			
		Current value	SN			
	Counter	Contact	CS	000000 to 001023	Decimal	
		Coil	CC			
		Current value	CN			
	Link special relay		SB	000000 to 0007FF	Hexadecimal	
	Link special register		SW	000000 to 0007FF	Hexadecimal	
	Step relay		S	000000 to 008191	Decimal	
	Direct input		DX	000000 to 000FFF	Hexadecimal	*1
	Direct output		DY	000000 to 000FFF	Hexadecimal	
Index register	Index register		Z	000000 to 000019	Decimal	---
File register	File register		R	000000 to 032767	Decimal	
			ZR	000000 to 3FD7FF	Hexadecimal	
Extended data register	Extended data register		D	• Binary: 000000 to 4184063 (4086k points maximum) • ASCII: 000000 to 999999 (976.6k points maximum)	Decimal	If the number of points is set on the PLC file tab of PLC parameter, access is possible up to the largest device number after the setting. However, in the ASCII code communication, the number of points described on the left is the access limit.
Extended link register	Extended link register		W	000000 to 3FD7FF (4086k points maximum)	Hexadecimal	If the number of points is set on the PLC file tab of PLC parameter, access is possible up to the largest device number after the setting.

*1 : Devices of DX/DY1000 or later are not available. Use X/Y devices to access devices of X/Y1000 or later.

3.3.4 Precautions

(1) Number of connected modules

In the connection with external devices using the MC protocol, the number of CPU modules set as "MELSOFT connection" in the open settings on Built-in Ethernet port tab of PLC parameter can be connected simultaneously.

(2) Data communication frame

Table3.4 shows the frames available in the Built-in Ethernet port QCPU.

Table3.4 Available frames in Built-in Ethernet port QCPU

Communication frame	Built-in Ethernet port QCPU
4E frame	×
QnA-compatible 3E frame	○
A-compatible 1E frame	×

(3) Access range

- Only connected CPU module can be accessed.
  Accessing a CPU module not connected results in an error.
- In a multiple CPU system, other CPU modules not connected to Ethernet cannot be accessed.
- Accessing a CPU module on another station in CC-Link IE controller network, MELSECNET/H, Ethernet or CC-Link via a connected CPU module is not possible.

(4) Precautions when UDP protocol is selected

- If a new request message is sent to the same UDP port while the port waits for a response message, the new request message is discarded.
- Setting same host station port number to multiple UDP ports is regarded as one setting. When communicating with multiple external devices using the same host station port number, select TCP protocol.

(5) Response message receive processing

Figure 3.22 shows an example of the response message receive processing on the external device side.

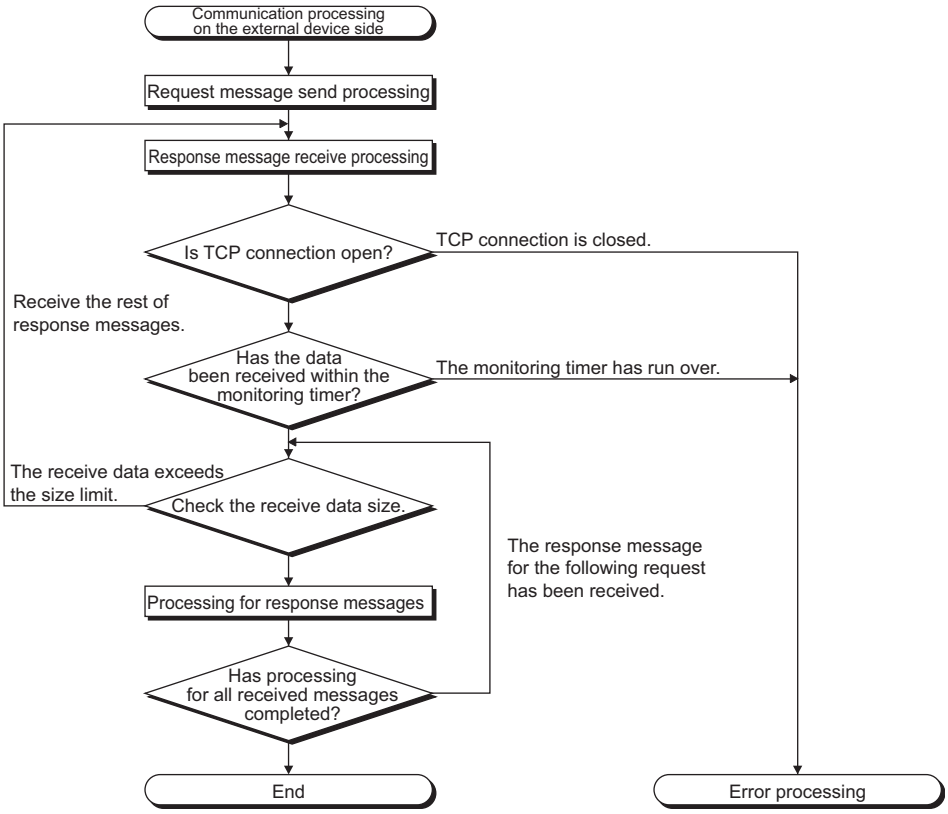

Communication processing on the external device side
Request message send processing
Response message receive processing
Is TCP connection open?
TCP connection is closed.
Receive the rest of response messages.
Has the data been received within the monitoring timer?
The monitoring timer has run over.
The receive data exceeds the size limit.
Check the receive data size.
The response message for the following request has been received.
Processing for response messages
Has processing for all received messages completed?
End
Error processing

Figure 3.22 Example of the response messages receive processing on the external device side

Remark

Personal computers use the TCP socket functions internally for Ethernet communication.
These functions do not have boundary concept. Therefore, when data is sent by executing the "send" function once, the "recv" function needs to be executed once, twice or more to receive the same data.
(One execution of the "send" function does not correspond to one execution of the "recv" function.)
For this reason, receive processing described above is required on the external device side.
If the "recv" function is used in blocking mode, data may be read by executing the function once.

3.3.5 Error codes for communication using MC protocol

Table3.5 shows the error codes, error descriptions, and corrective actions that will be sent from the CPU module to an external device when an error occurs during communication using the MC protocol.

Table3.5 List of available devices in CPU module

No.	Error code (Hexadecimal)	Description	Corrective action
1	4000H to 4FFFH	CPU detected error (Error that occurred in other than communication using the MC protocol)	Refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection) and take corrective action.
2	0055H	When the setting for online change is disabled on the Built-in Ethernet port tab of PLC parameter in GX Developer, an external device requested online change to the CPU module.	• When enabling online change, write data. • Change the status of the CPU module to STOP and write data.
3	C050H	When the communication data code setting is set to ASCII code in the Built-in Ethernet port QCPU, ASCII code data that cannot be converted to binary code was received.	• Set the communication data code to binary code and restart the Built-in Ethernet port QCPU for communication. • Correct the send data on the external device side and resend the data.
4	C051H to C054H	The number of device points for reading/writing is outside the allowable range.	Correct the number of device points for reading/writing and resend the data to the Built-in Ethernet port QCPU.
5	C056H	The read/write request data exceeds the allowable address range.	Correct the start address or the number of device points for reading/writing, and resend the data to the Built-in Ethernet port QCPU. (Do not exceed the allowable address range.)
6	C058H	The request data length after the ASCII to binary conversion does not match the data size of the character area (a part of text data).	Check and correct the text data or the request data length of the header data, and resend the data to the Built-in Ethernet port QCPU.
7	C059H	• The command and/or subcommand are specified incorrectly. • The command and/or subcommand not supported in the Built-in Ethernet port QCPU are specified.	• Check the request data. • Use commands and/or subcommands supported in the Built-in Ethernet port QCPU.
8	C05BH	The Built-in Ethernet port QCPU cannot read/write data from/to the specified device.	Check the device for reading/writing data.
9	C05CH	The request data is incorrect. (ex. specifying data in units of bits for reading/writing of word devices)	Correct the request data (such as subcommand correction) and resend the data to the Built-in Ethernet port QCPU.
10	C05DH	Monitor registration is not performed.	Perform the monitor registration before monitor operation.
11	C05FH	The external device sent a request that cannot be executed in the target CPU module.	• Correct the network number, PC number, request destination module I/O number, and request destination module station number. • Correct the read/write request data.
12	C060H	The request data is incorrect. (ex. incorrect specification of data for bit devices)	Correct the request data and resend the data to the Built-in Ethernet port QCPU.
13	C061H	The request data length does not match the data size of the character area (a part of text data)	Check and correct the text data or the request data length of the header data, and resend the data to the Built-in Ethernet port QCPU.
14	C06FH	The CPU module received a request message in ASCII when the communication data code setting is set to binary code, or received a request message in binary when the data code setting is set to ASCII code. (As for this error code, only error history is registered. The error response message is not returned.)	• Send request messages corresponding to the communication data code setting. • Set the communication data code corresponding to the request message.
15	C070H	The device memory extension cannot be specified for the target station.	Read/Write data to the device memory without specifying the extension.
16	C0B5H	Data that cannot communicate in the CPU module or Ethernet module is specified.	• Check the request data. • Stop the current request.
17	C200H	The remote password is incorrect.	Check the remote password and perform unlock/lock processing again.
18	C201H	The communication target port is in the remote password locked status. Or, when the communication data code setting is set to ASCII code, any data of subcommands and later cannot be converted to binary code since the remote password is locked.	Perform remote password unlock processing before communication.

No.	Error code (Hexadecimal)	Description	Corrective action
19	C204H	The external device is different from the one that quested remote password unlock processing.	Have the same external device which has requested unlock processing request remote password lock processing.

3.4 Time Setting Function (SNTP Client)

The Built-in Ethernet port QCPU collects time information from a time information server connected to LAN, making it possible to set the CPU time automatically.
The Built-in Ethernet port QCPU time setting function queries a time information server to get the time at the specified timing and sets the time sent from the time information server as clock data for the CPU module.

The time setting operation is executed based on the following timing.

- At programmable controller power ON or CPU module reset.
- Execution at a specified time interval (Execution interval)
- Execution at a specified time (Execution time)
- At special relay ON.*1

*1 : Time is set when the special relay (SM1270) is turned ON for one scan.

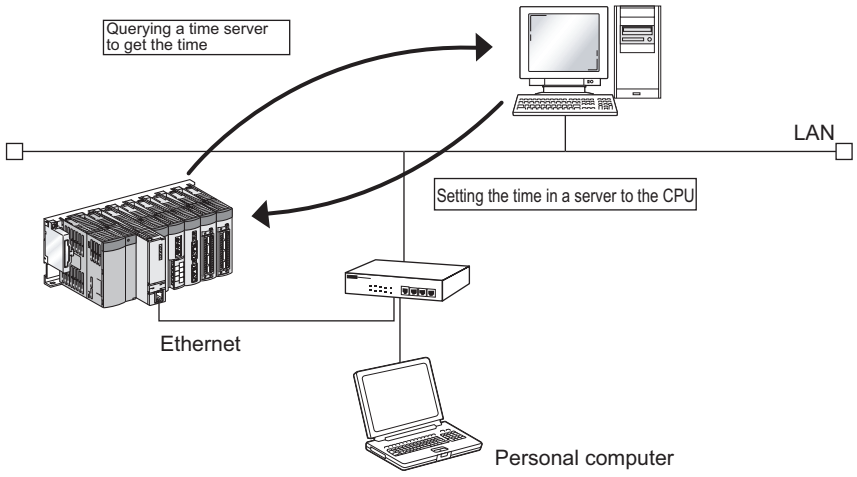


Figure 3.23 Image of time setting function

Point

- Check the connection of the hub or the external device first when executing a time setting operation at programmable controller power ON or CPU module reset.
- The time setting result details can be checked with the special registers (SD1270 to SD1275).
- Other time setting operations are ignored during execution of the time setting function.

3.4.1 Setting for time setting function

Set the time in the Built-in Ethernet port tab of the PLC parameter dialog box.

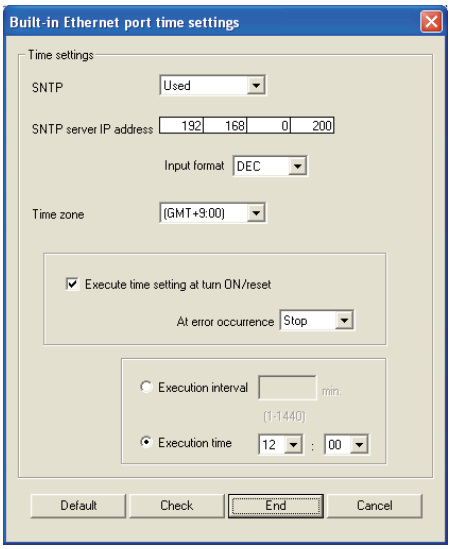


Figure 3.24 Time settings screen

Table3.6 Setting items on the time settings screen

Item	Description	Setting range
SNTP	Select whether to use the time setting function. (Required)	Used or Not used
SNTP server IP address	Specify the SNTP server IP address. (Required)	-
Time zone	Specify the time zone in which the time is to be synchronized. (Required) Default is set to Japan Standard Time "GMT + 9:00".	(GMT-12:00 to GMT+13:00)
Execute time setting at turn ON/ reset	Select whether to execute the time setting function when the programmable controller is powered ON or when the CPU module is reset.	-
At error occurrence	Select whether to stop or continue when a time setting error occurs when the programmable controller is powered ON or when the CPU module is reset.	Continue or Stop
Execution interval *2	Select to execute the time setting function at a specified time interval.	1 to 1440 min.
Execution time *2	Select to execute the time setting function at a specified time. (in increments of 30 minutes)	00:00 to 23:30

*2 : Either of the two options must be selected.

3.4.2 Precautions

(1) Communication time-out

A communication time-out occurs when the Built-in Ethernet port QCPU has not received time information for 20 seconds from when querying a time information server.
Besides, when a communication time-out occurs, the value in SD1270 changes to 0FFFFH.

(2) Time information server

To use the time setting function, an SNTP server personal computer (time information server) is required on LAN.

(3) Delay resulted from the time required for communication

A delay occurs with respect to the time set in the CPU module as a result of the time required for communication with the server. Specify the closest SNTP server possible on the network.

(4) For multiple CPU system configuration

In a multiple CPU system, enable the time setting function of only the Built-in Ethernet port QCPU No.1.
When a CPU module other than the Built-in Ethernet port QCPU No. 1 is enabled, the clock data of the Built-in Ethernet port QCPU No. 1 is automatically set.

3.5 File Transfer Function (FTP)

The Built-in Ethernet port QCPU supports the FTP (File Transfer Protocol) server function. FTP is a protocol for transferring files between CPU modules and external devices.
An external device with a FTP client function can simply access to files within the CPU module directly by using this FTP server function.

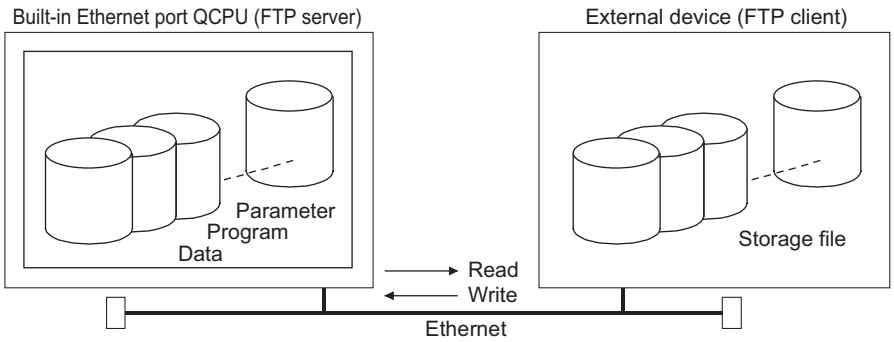


Figure 3.25 File transfer function (FTP)

The following accesses can be performed to files in the Built-in Ethernet port QCPU from an external device with a FTP client function.

(a) Reading (downloading) files from Built-in Ethernet port QCPU

A function for storing CPU module files in an external device.

(b) Writing (uploading) files to Built-in Ethernet port QCPU

A function for registering files stored in an external device to the CPU module.

(c) Browsing Built-in Ethernet port QCPU file names

A function for checking files registered in the CPU module on the external device side.

Point

In a multiple CPU system, only the CPU module connected with an Ethernet cable can transfer files.

3.5.1 Setting for FTP communication

Setting for communication using the FTP is described below.

(1) Operation for CPU module

Set the items in the Built-in Ethernet port tab of the PLC parameter dialog box.

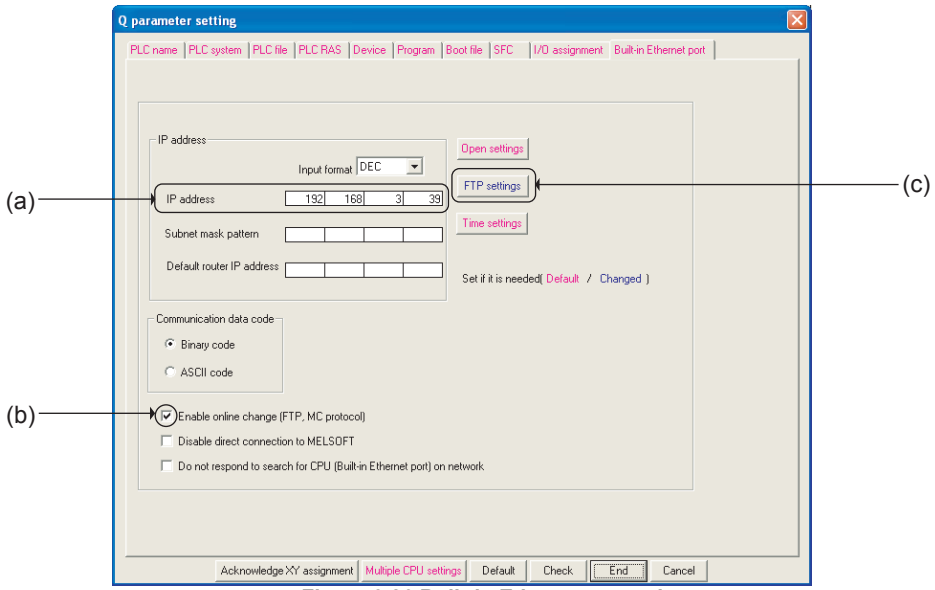


Figure 3.26 Built-in Ethernet port tab

(a) IP address

Set an IP address for CPU module.

(b) Enable online change (FTP, MC protocol)

Check this checkbox to enable online change.

(c) FTP setting

Set the FTP parameters as shown below.

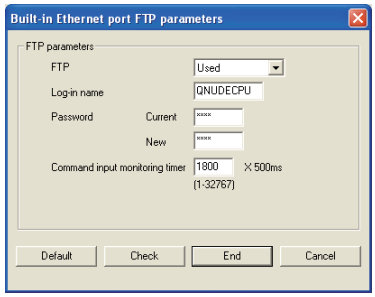


Figure 3.27 FTP settings screen

Table3.7 Setting items on the FTP settings screen

Item	Description
FTP	Set to "Used".
Log-in name	Set the login name for an external device to request file transfer (log in).
Password	Set the FTP password for an external device to request file transfer (log in). To change the password, enter both the old and the new passwords for confirmation.
Command input monitoring timer	Set the monitoring time for command input performed by the CPU module. When no command is input within the set period of time, the FTP connection is disconnected. (Setting range : 1 to 32767 (× 500ms)) Set the value so that the time will be larger than the time required for file transfer.

Remark

To access the CPU module via a router, set the "Subnet mask pattern" and the "Default router IP address" settings as well.(☞ Section 3.1.4)

(2) Operation on external device (FTP client) side

The procedure and required processing on the external device side when using the FTP server function of Built-in Ethernet port QCPU are described below.

FTP operation commands used in each operation and their input methods are also described.

(<ret> indicates an input of the CR, Enter or Return key.)

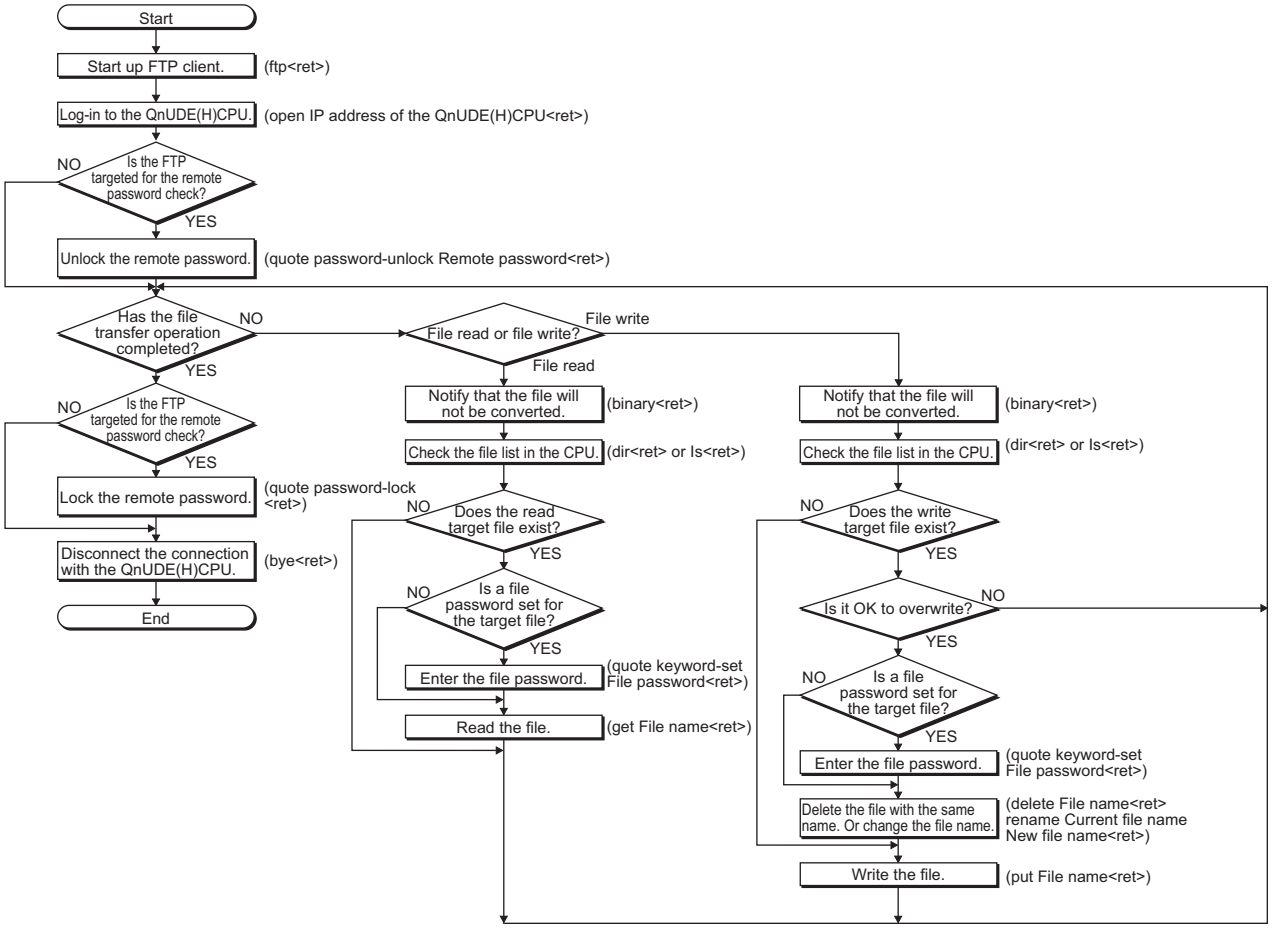


Figure 3.28 FTP client side operation procedure

(a) Logging in to Built-in Ethernet port QCPU

Operations from starting the FTP to logging in to the Built-in Ethernet port QCPU are described below.

Example) Start up the FTP from the MS-DOS prompt of a Microsoft® Windows® XP Operating System.

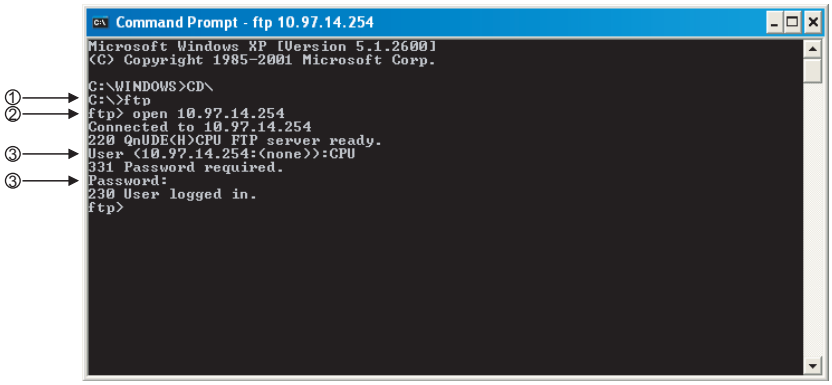


Figure 3.29 Example of screen for logging in to Built-in Ethernet port QCPU

① Start FTP (FTP<ret>)

② Connect to FTP server (open Built-in Ethernet port QCPU IP address<ret>)

③ Specify login name (Login name (Default: QNUDECPU)<ret>)
Specify password (Password (Default: QNUDECPU)<ret>)

(b) Unlocking/Locking remote password

When the FTP communication port is specified for a remote password check target in remote password settings, the remote password needs to be unlocked using the following command.
(quote password-unlock Remote password<ret>)

At the end of the operation, change the remote password to the locked status using the following command.
(quote password-lock<ret>)

Point

When the FTP communication port is specified for a remote password check target in remote password settings, other commands cannot be used until the remote password is unlocked.

(c) Entering file password

When a file password is set for the target file, the file password needs to be entered using the following command before accessing the file.
(quote keyword-set File password<ret>)

3.5.2 List of transferable files

Table3.8 lists the transferable files using the file transfer function.

Table3.8 List of transferable files

Target memory	Built-in memory			Memory card (RAM)	Memory card (ROM)		File name or extension
File storage drive number	0	3	4	1	2	2	
File type	Program memory *2 *3	Standard RAM	Standard ROM *4	SRAM card *4	Flash card	ATA card *4	
Parameter	○	×	×	×	×	×	PARAM.QPA
Intelligent function module parameter	○	×	×	×	×	×	IPARAM.QPA
Program	○	×	×	×	×	×	.QPG
Device comment	○	×	×	×	×	×	.QCD
Device initial value	○	×	×	×	×	×	.QDI
Device data	×	×	×	×	×	×	.QST
File register	×	○	×	○	○	×	.QDR
Local device	×	×	×	×	×	×	.QDL
Sampling trace file	×	×	×	×	×	×	.QTD
Error history data	×	×	×	×	×	×	.QFD
Programmable controller user data *1	×	×	○	×	×	○	Arbitrary file name
User setting area	×	×	×	×	×	×	-

○ :Transferable, × :Not transferable

*1 : A file for reading/writing data by a sequence program using the following instructions:
- SP.FREAD (Batch-reads data from the specified file in the memory card.)
- SP.FWRITE (Batch-writes data to the specified file in the memory card.)

For details on the SP.FREAD/SP.FWRITE instructions, refer to the following manual.

☞ QCPU Programming Manual (Common Instructions)

*2 : Writing files to the program memory is enabled only when the CPU module is in the STOP status.

*3 : Write destination is the program cache memory.

The user should back up files using the "pm-write" command as required.(☞ Section 3.5.5)

*4 : The number of files written using the File transfer function (FTP) is up to the number described below.
[The maximum number of files can be stored in the corresponding drive -1]

3.5.3 List of FTP commands

Table3.9 lists the FTP client commands can be used in the Built-in Ethernet port QCPU.

Table3.9 List of FTP client side user interface commands

Command	Function	CPU module status			Remote password		Remarks
		STOP	RUN		Unlocked *2	Locked *2	
			Write enabled *1	Write disabled *1			
binary	Notifies that a file is to be transferred to the FTP server without conversion.	○	○	○	○	×	-
bye	Disconnects the FTP server connection and ends the FTP function.	○	○	○	○	○	
close	Disconnects the FTP server connection.	○	○	○	○	○	
delete	Deletes a file stored in the Built-in Ethernet port QCPU.	○	○	×	○	×	
dir	Displays file information stored in the Built-in Ethernet port QCPU.	○	○	○	○	×	
get	Reads a file from the Built-in Ethernet port QCPU.	○	○	○	○	×	
ls	Displays the file names of files stored in the Built-in Ethernet port QCPU.	○	○	○	○	×	
mdelete	Deletes a file stored in the Built-in Ethernet port QCPU.	○	○	×	○	×	
mdir	Saves information of files stored in the Built-in Ethernet port QCPU.	○	○	○	○	×	
mget	Reads a file from the Built-in Ethernet port QCPU.	○	○	○	○	×	
mls	Saves names of files stored in the Built-in Ethernet port QCPU.	○	○	○	○	×	
mput	Writes a file to the Built-in Ethernet port QCPU.	○	○	×	○	×	
open	Connects to the FTP server.	○	○	○	○	○	
put	Writes a file to the Built-in Ethernet port QCPU.	○	○	×	○	×	
pwd	Displays the current directory name of the Built-in Ethernet port QCPU.	○	○	○	○	×	
quit	Disconnects the FTP server connection and ends the FTP function.	○	○	○	○	○	
quote	Sends an FTP server subcommand.	○	○	○	○	○	*3
rename	Renames a Built-in Ethernet port QCPU file.	○	○	×	○	×	-
user	Inputs the user name and password of Built-in Ethernet port QCPU.	○	○	○	○	○	

○ : PerformableI, × : Not performable

*1 : These indicate the online change enable and disable settings made in the Built-in Ethernet port tab of the PLC parameter dialog box.

*2 : These indicate the remote password execution status when FTP communication port specified for remote password check target on the Remote password detail settings screen in GX Developer.
For details of the remote password, refer to Section 3.6.

*3 : Table3.10 lists the subcommands that can be used with the "quote" command.

Table3.10 Subcommands that can be used with "quote" command

Command	Function	CPU module status			Remote password		Remarks
		STOP	RUN		Unlocked	Locked	
			Write enabled	Write disabled			
change	Displays/changes the Built-in Ethernet port QCPU file attribute.	○	○	×	○	×	-
keyword-set	Sets/displays/clears the Built-in Ethernet port QCPU file access password.	○	○	○	○	×	
password-lock	Specifies the remote password and changes the status from unlocked to locked.	○	○	○	○	× *1	
password-unlock	Specifies the remote password and changes the status from locked to unlocked.	○	○	○	○	○	
status	Displays the operation information of the Built-in Ethernet port QCPU.	○	○	○	○	×	
run	Changes the Built-in Ethernet port QCPU status to RUN.	○	○	○	○	×	
stop	Changes the Built-in Ethernet port QCPU status to STOP.	○	○	○	○	×	
pm-write	Writes files to the program memory.	○	×	×	○	×	

○ : PerformableI, × : Not performable

*1 : Even if the subcommand is executed, the remote password status remains locked and an error does not occur.

3.5.4 How to read FTP commands

(1) FTP command descriptions

The FTP operation commands (on the FTP client (external device) side) which can be used in the Built-in Ethernet port QCPU are described below.

How to read descriptions
Sections in brackets at [Specification format] can be omitted.

(2) File specification methods

File specification method which is specified during execution of an FTP operation command (on the FTP client side) is described below.

- For the Built-in Ethernet port QCPU, files are specified using drive names and file names.
- When specifying a file in the Built-in Ethernet port QCPU using the FTP function, specify the target file in the following order.
  [Specification format] Drive name : \ File name . extension
  [Specification example] 3:\MAINSEQ1.QDR
  [Specification details] Refer to the following 1) and 2).

1) Drive name (Drive No.)
   Specify the drive name of the file transfer target memory.
   For the correspondence between Built-in Ethernet port QCPU target memory and drive name, refer to Table3.8.

2) File name, extension
   - Specify the file transfer target file.
   - Specify the file name according to the rules for naming files using GX Developer.
     Characters that can be used are one-byte alphabets (uppercase), numbers, and symbols. Lowercase alphabets cannot be used.
     File name : 8 characters maximum (one-byte)
     Extension : 3 characters maximum (one-byte)
     Alphabets are not case-sensitive. Lowercase alphabets are treated as uppercase alphabets.
   - For the extension, the name fixed by the Built-in Ethernet port QCPU must be used.
     Specify the extension for the target file in accordance with Table3.8.
   - For details of the file names and extensions, refer to the following manual.
     ☞ GX Developer Version 8 Operating Manual
   - When using FTP operation commands which can target multiple files, specify the file names and extensions within the file path name using a wild card (* and/or ?).
     * : Used for specifying all files having arbitrary characters (including no characters) after the location where "*" is used.
     ? : Used for specifying all files having arbitrary characters (including no characters) at the location where the "?" is used. (Multiple "?" can be used.)
     Some FTP clients have restrictions on characters that can be used for file names other than those described above.

3.5.5 Detail of FTP commands

Functions and usages of FTP operation commands (on the FTP client side) which can be used in the Built-in Ethernet port QCPU are described below.

Point

Note that some FTP operation commands (on the FTP client side) which can be used in the Built-in Ethernet port QCPU may not operate as described in this manual, depending on the FTP application used on the FTP client side.
Check the functions and operation methods, referring to the manuals on the FTP client side.

(1) FTP server support commands

● binary

[Function]	Notifies that a file is to be transferred to the FTP server without conversion. Neither return codes nor kanji codes are converted. This command is set automatically in the Built-in Ethernet port QCPU.
[Specification format]	binary (abbreviated format bin)

● bye

[Function]	Disconnects the FTP server connection and ends the FTP function.
[Specification format]	bye
[Identical function]	quit

● close

[Function]	Disconnects the FTP server connection.
[Specification format]	close

● delete

[Function]	Deletes a file stored in the Built-in Ethernet port QCPU.
[Specification format]	delete File path name
[Specification example]	When deleting a file stored in the ATA card delete2:\MAINSEQ1.USR
[Similar function]	mdelete

● dir

[Function]	Displays the names, created dates, and sizes of files stored in the Built-in Ethernet port QCPU.
[Specification format]	dir [Drive name:\]
[Specification example]	When displaying the detailed information of files stored in the RAM area of the memory card dir1:\
[Similar function]	ls

● get

[Function]	Reads a file from the Built-in Ethernet port QCPU.
[Specification format]	get Transfer source file path name [Transfer destination file path name]
[Specification example1]	When reading a file stored in the SRAM card and saving that file under the same file name get1:\MAINSEQ1.QDR
[Specification example2]	When reading a file stored in the SRAM card and saving that file under a different file name get1:\SEQ1BAK.QDR\SEQ10LD.QDR
[Note]	• When the transfer destination file path name (FTP client side) is not specified, the file is saved on the FTP client side using the same file name as the transfer source file name (Built-in Ethernet port QCPU side). • The transfer destination is on the current directory of which when FTP is started up and connected to the server.

● ls

[Function]	Displays the names of files stored in the Built-in Ethernet port QCPU.
[Specification format]	ls [Drive name:\]
[Specification example]	When displaying the names of files stored in the SRAM card ls1:\
[Similar function]	dir

● mdelete

[Function]	Deletes a file stored in the Built-in Ethernet port QCPU. To delete multiple files, specify the file names and extensions within the file path name using a wild card (* and/or ?).
[Specification format]	mdelete File path name (abbreviated format: mdel)
[Specification example]	When deleting all files whose extensions are "QPG" among the files stored in the ATA card mdelete2:*.QPG
[Similar function]	delete

● mdir

[Function]	Saves detailed information (file names, created dates, and sizes) of files stored in the Built-in Ethernet port QCPU as log data in a file on the FTP client side.
[Specification format]	mdir Transfer source drive name:\ Transfer destination file path name
[Specification example]	When saving detailed information of files stored in the SRAM card to the S990901.LOG file mdir1:\S990901.LOG
[Note]	• Specify "\" immediately after the transfer source drive name. • Specify the transfer source drive name when specifying the transfer destination file path name (FTP client side). • When the transfer destination file path name is not specified, the file is saved using a file name determined by the FTP application on the FTP client side. • The transfer destination is on the current directory of which when FTP is started up and connected to the server.
[Similar function]	mls

● mget

[Function] Reads a file from the Built-in Ethernet port QCPU.
To read multiple files, specify the file names and extensions within the file path name using a wild card (* and/or ?).
When reading multiple files, receive status is checked for each file transfer.

[Specification format] mget File path name

[Specification example] When reading all files whose extensions are "USR" among the files stored in the ATA card
mget2:*.USR

[Note] The read file is saved on the FTP client side under the same file name.
The save destination is on the current directory of which when FTP is started up and connected to the server.

● mls

[Function] Saves the names of files stored in the Built-in Ethernet port QCPU as log data in a file on the FTP client side.

[Specification format] mls Transfer source drive name:\ Transfer destination path name

[Specification example] When saving the names of files stored in the SRAM card to the S990901F.LOG file
mls1:\S990901F.LOG

[Note]
- Specify "\" immediately after the transfer source drive name.
- Specify the transfer source drive name when specifying the transfer destination file path name (FTP client side).
- When the transfer destination file path name is not specified, the file is saved using a file name determined by the FTP application on the FTP client side.
- The transfer destination is on the current directory of which when FTP is started up and connected to the server.

[Similar function] mdir

● mput

[Function] Writes a file to the Built-in Ethernet port QCPU.
To write multiple files, specify the file names and extensions within the file path name using a wild card (* and/or ?).
When writing multiple files, send status is checked for each file transfer.

[Specification format] mput Transfer source file path name

[Specification example] When writing all files whose extensions are "USR"
mput*.USR

[Note] The save destination file name is the same as that on the FTP client side.
The transfer destination is the memory in which the parameter files used during the current operation are stored.

● open

[Function] Connects to the FTP server based on a specified host name or IP address and port number on the FTP server side.

[Specification format]
open Host name [Port number]
open IP address [Port number]

- Host name : Host name set in Microsoft® Windows® hosts file
- IP address: Built-in Ethernet port QCPU IP address
- Port number: Port number to be used

[Specification example1] When connecting to the FTP server by specifying a host name
open HOST

[Specification example2] When connecting to the FTP server by specifying an IP address
open 192.0.1.254

[Note] Connection is also possible by specifying an IP address when FTP is started up.

● put

[Function]	Writes a file to the Built-in Ethernet port QCPU.
[Specification format]	put Transfer source file path name [Transfer destination file path name]
[Specification example1]	When writing the MAINSEQ1.QDR file to the SRAM card with the same file name put MAINSEQ1.QDR1:\MAINQDR1.QDR
[Specification example2]	When writing the MAINSEQ.QDR file to the SRAM card with a different file name put MAINSEQ.QDR1:\MAINQDR1.QDR
[Note]	• When the transfer destination file path name (FTP client side) is not specified, the files on the current directory of which when FTP is started up and connected to the server are written. • When the transfer destination file path name (FTP server side) is not specified, the files are saved in the memory in which the parameter files used during the current operation are stored.

● pwd

[Function]	Displays the current directory name of the Built-in Ethernet port QCPU.
[Specification format]	pwd
[Note]	"\" is displayed as the execution result of the "pwd" command.

● quit

[Function]	Disconnects the FTP server connection and ends the FTP function.
[Specification format]	quit
[Identical function]	bye

● quote

[Function]	Sends an FTP server subcommand (Built-in Ethernet port QCPU dedicated subcommand).
[Specification format]	quote
[Specification example]	quote password-lock
[Note]	Only Built-in Ethernet port QCPU dedicated subcommands can be specified. Refer to (2).

● rename

[Function]	Renames a Built-in Ethernet port QCPU file.
[Specification format]	rename Old file path name New file path name (abbreviated format: ren)
[Specification example]	When renaming a file stored in the SRAM card rename 1:\MAINSEQ1.QDR1:\SEQ1OLD.QDR
[Note]	The following response codes are displayed upon normal completion. 350 Need more info. 250 Rename successful.

● user

[Function]	Inputs the user name and password of the connected FTP server.
[Specification format]	user User name [FTP password] • User name: Login name set in Built-in Ethernet port QCPU parameter • FTP password: FTP password set in Built-in Ethernet port QCPU parameter
[Specification example1]	When specifying a user name user CPU
[Specification example2]	When specifying a user name and password user CPU CPU

(2) Built-in Ethernet port QCPU dedicated subcommands

The Built-in Ethernet port QCPU dedicated subcommands added to and sent with the FTP operation "quote" command are described below.

● change

[Function] Displays/changes Built-in Ethernet port QCPU file attribute.

[Specification format1] When displaying file attribute
quote change File path name
One of the following is displayed as the execution result upon normal completion.
- When the specified file is a read-only file : ----- R
- When the specified file is a read/write-enabled file : ----- W

[Specification format2] When changing file attribute
quote change File path name Attribute
Use one of the following for specifying the attribute.
- To change the file to read-only file : r
- To change the file to a read/write-enabled disk file : w

[Specification example1] When displaying file attribute stored in the SRAM card
quote change 1:\MAINSEQ1.QDR

[Specification example2] When changing file attribute stored in the SRAM card
quote change 1:\MAINSEQ1.QDR r

● keyword-set

[Function] Sets a file password registered in the file transfer target file into the Built-in Ethernet port QCPU.*1
Or, displays/clears the password set for FTP settings in parameter.

[Specification format] quote keyword-set [File password]
- File password :Specify the file password registered in the Built-in Ethernet port QCPU file. To clear the set file password, specify "*****".

One of the following is displayed as the execution result upon normal completion.
- When setting a file password : 200 Command successful
- When displaying a file password: 200 Keyword is "File password"
- When clearing a file password : 200 Command successful

[Specification example1] When setting the password (1234)
quote keyword-set 1234

[Specification example2] When displaying the password currently set for FTP settings in parameter
quote keyword-set

[Specification example3] When clearing the password currently set for FTP settings in parameter
quote keyword-set ****

[Note]
- One file password can be set for the FTP settings in Built-in Ethernet port QCPU parameter.
  When the file targeted for file transfer changes, re-set the file password of the target file when a file password is also registered for the change target file.
- When logging in to the Built-in Ethernet port QCPU, the file password is initialized (cleared) to "*****".

* 1 : This command is used only when a file password is registered in the file transfer target file. When accessing the specified file, the Built-in Ethernet port QCPU checks the file password.

● password-unlock

[Function] Specifies the remote password set in the Built-in Ethernet port QCPU and performs unlock processing.*2

[Specification format] quote password-unlock [Remote password]

- Remote password: Specify the remote password set in Built-in Ethernet port QCPU parameter.

The following is displayed as the execution result upon normal completion.

200 Command 0key

The following is displayed when the entered remote password and set remote password do not match.

556 Password Error

The following is displayed when another command is requested before unlock processing of the remote password is performed.

555 Password Locked

[Specification example] When specifying the remote password (1234)

quote password-unlock 1234

[Note]

- The remote password is locked when logged in to the Built-in Ethernet port QCPU if the FTP communication port is specified for a remote password check target.
- Performing unlock processing by executing this command before the various FTP operations enables file operations in the Built-in Ethernet port QCPU.
- Processing completes normally if the remote password unlock processing is performed when the FTP communication port is not specified for a remote password check target.

*2 : This command is used only when FTP communication port is specified for a remote password check target.

● password-lock

[Function] Performs lock processing of the remote password set in the Built-in Ethernet port QCPU.*3

[Specification format] quote password-lock

The following is displayed as the execution result upon normal completion.

200 Command 0key

[Specification example] When locking the remote password

quote password-lock

*3 : This command is used only when FTP communication port is specified for a remote password check target.

● run

[Function] Changes the Built-in Ethernet port QCPU status to RUN. (Executes remote RUN.)
When changing the Built-in Ethernet port QCPU status to RUN, device memory clear can be specified.

[Specification format] quote run [Mode [Clear mode]]
- Mode: Specify whether to execute remote RUN forcibly.
  0 : Normal RUN (default)
  1 : Forced RUN
- Clear mode:
  Specify the clear (initialization) processing of the Built-in Ethernet port QCPU device memory when an operation starts by executing remote RUN.
  0 : Do not clear device (default)
  1 : Clear all devices excluding latch range
  2 : Clear all devices including latch range

The following message is displayed as the execution result upon normal completion.
200 Command successful

[Specification example1] When executing remote RUN, specifying "Normal RUN" and "Do not clear device"
quote run

[Specification example2] When executing remote RUN, specifying "Forced RUN" and "Do not clear device"
quote run 1

[Specification example3] When executing remote RUN, specifying "Forced RUN" and "Clear all devices excluding latch range"
quote run 1 1

[Note]
- Forced RUN mode is used to forcibly execute remote RUN to the Built-in Ethernet port QCPU from other devices when a trouble occurs in the device which executed remote STOP to the Built-in Ethernet port QCPU (the device can no longer execute remote RUN to the Built-in Ethernet port QCPU).
  When Normal RUN mode is specified, the status will not change to RUN if the Built-in Ethernet port QCPU is already set in the STOP/PAUSE status by another device.
- Specify the clear mode at the start of an operation based on the system arrangement. After the specified clear processing is performed, the Built-in Ethernet port QCPU changes to the RUN status in accordance with the parameter settings ("Initial Device value" setting on the PLC file tab of PLC parameter).

● status

[Function] Displays the operation information of the Built-in Ethernet port QCPU.
This command checks the Built-in Ethernet port QCPU operation information when executing file transfer to the Built-in Ethernet port QCPU.

[Specification format] quote status

One of the following is displayed as the execution result upon normal completion.
- When the Built-in Ethernet port QCPU is in the RUN status: "RUN"
- When the Built-in Ethernet port QCPU is in the STOP status: "STOP"
- When the Built-in Ethernet port QCPU is in the PAUSE status: "PAUSE"

● stop

[Function]	Changes the Built-in Ethernet port QCPU status to STOP. (Executes remote STOP.)
[Specification format]	quote stop The following message is displayed as the execution result upon normal completion. 200 Command successful
[Note]	Write files to the program memory after the Built-in Ethernet port QCPU status is changed to STOP using this command.

● pm-write

[Function]	Transfers files in the program cache memory to the program memory.
[Specification format]	quote pm-write The following message is displayed as the execution result upon normal completion. 200 Command successful
[Note]	Write files after the Built-in Ethernet port QCPU status is changed to STOP.

3.5.6 Precautions

Precautions for using the file transfer function are described below.

(1) FTP clients

- FTP command specifications may differ from those described in this manual, depending on the FTP client. In such a case, check the functions and operation methods, referring to the manuals on the FTP client side.
- FTP operations cannot be performed from Microsoft® Internet Explorer. If performed, an error occurs with Internet Explorer.

(2) Processing in Built-in Ethernet port QCPU

- Files only in the drives of the host station Built-in Ethernet port QCPU can be accessed.
- During file access, do not turn OFF the power supply, reset the CPU module or install/remove a memory card. If any of these operations are performed, files may corrupt.
- During file access, do not perform any file operations from peripherals such as GX Developer. When a file operation is performed from another peripheral during FTP function operation, an error may occur on the peripheral side.
- During online change, do not perform any file operations using the FTP function. When a file operation is performed, an error may occur.
- During file access using the FTP function, do not perform any online operations from peripherals such as GX Developer. When an online operation is performed, an error may occur on the peripheral side.
- During backup or restoration of the CPU module change function using a memory card, an error occurs in file access from FTP clients.
  In that case, access the file again after the backup or restoration operation is completed.
  Moreover, if the backup or restoration operation is performed during file access from FTP clients, an error occurs.
  In that case, perform the backup or restoration operation again after blocking the communication with FTP clients.

(3) Communication processing

- When a time-out error occurs during file transfer, the TCP connection will be closed (disconnected). To restart the file transfer, log in to the Built-in Ethernet port QCPU once again from an FTP client.
- In a communication using FTP connections, an existence check of external devices is performed. For operation details, refer to Section 3.1.3.
- The file transfer processing time depends on the following factors.
  1) Load rate of the Ethernet line (line traffic)
  2) Number of connections simultaneously used (communication processing of other connections)
  3) System configuration
- The number of external devices (FTP clients) that can be simultaneously logged in to the Built-in Ethernet port QCPU is only one. When another FTP client attempts the connection to the Built-in Ethernet port QCPU which is in the logged-in status, connection cannot be established and an error occurs.
- If the File transfer function using the FTP is executed simultaneously with other communication functions (MELSOFT connection, MC protocol) using the UDP, an error, such as a time-out error, may occur. Execute other communication functions after file transfer is completed or communicate using the TCP.

(4) Precautions for writing files

- Operation to overwrite an existing file cannot be performed.
  Either delete the file using a file delete command (delete, mdelete) or rename the file using a file name change command (rename) before writing the file.
- Files whose attribute is read-only or files which are locked by other devices/functions cannot be written. If files are written, a write error occurs.
- File transfer (writing files) cannot be executed when a write-protected memory card is used. If files are written, a write error occurs.
- When a file is written, a temporary file (FTP_I***.TMP) is created automatically. The name of this file is changed to the name of written file upon normal completion. However, if the power failure or reset of the CPU module occurs during the file write, this temporary file may remain. If this occurs, delete the temporary file.
- When file registers are used in the standard RAM or SRAM card, change the CPU status to STOP first, and then write /delete files to/in these drives.
- When file registers used in the standard RAM or SRAM card are set as auto refresh devices, do not write/delete files to/in these drives.
- If large-capacity files are written to the ATA card during RUN, a load on write processing increases and a communication error may occur. Change the CPU status to STOP to write large-capacity files.

(5) Precautions for deleting files

- The timing for deleting files is to be arranged by the user considering the overall system, including Built-in Ethernet port QCPU and GX Developer.
- Files whose attribute is read-only or files which are locked by other devices/functions cannot be deleted. If files are deleted, a delete error occurs.
- Deleting files cannot be executed when a write-protected memory card is used. If files are deleted, a delete error occurs.

3.6 Remote Password

This function checks a remote password when the communication using the following connections is requested.

- Communication using GX Developer
- Communication using the MC protocol
- File transfer

Point

The remote password function is a function to prevent unauthorized access (ex. corrupting data and programs) from external devices.
However, this function cannot completely prevent unauthorized access.
Users should incorporate safety measures by themselves if security of the programmable controller system needs to be maintained against unauthorized access from external devices. We cannot be held responsibility for any problems caused by unauthorized access.

[Examples of measures against unauthorized access]

- Install a firewall.
- Set up a personal computer as a relay station and control the relay of communication data using an application program.
- Set up an external device that control access authority as a relay station.
  Please consult a network provider or equipment sales company regarding external devices that can control access authority.

3.6.1 Communication method when a remote password is set

The communication procedure with the Built-in Ethernet port QCPU with a preset remote password is described below.

(1) Access enable processing (unlock processing)

An external device such as a personal computer performs remote password unlock processing for the CPU module.

When unlock processing is not performed, an error occurs in the external device since the CPU module does not accept access.

(2) Access processing

Access is enabled after the remote password unlock processing is completed normally.

(3) Access disable processing (lock processing)

Remote password lock processing is performed from the external device to disable subsequent access after the access is completed.

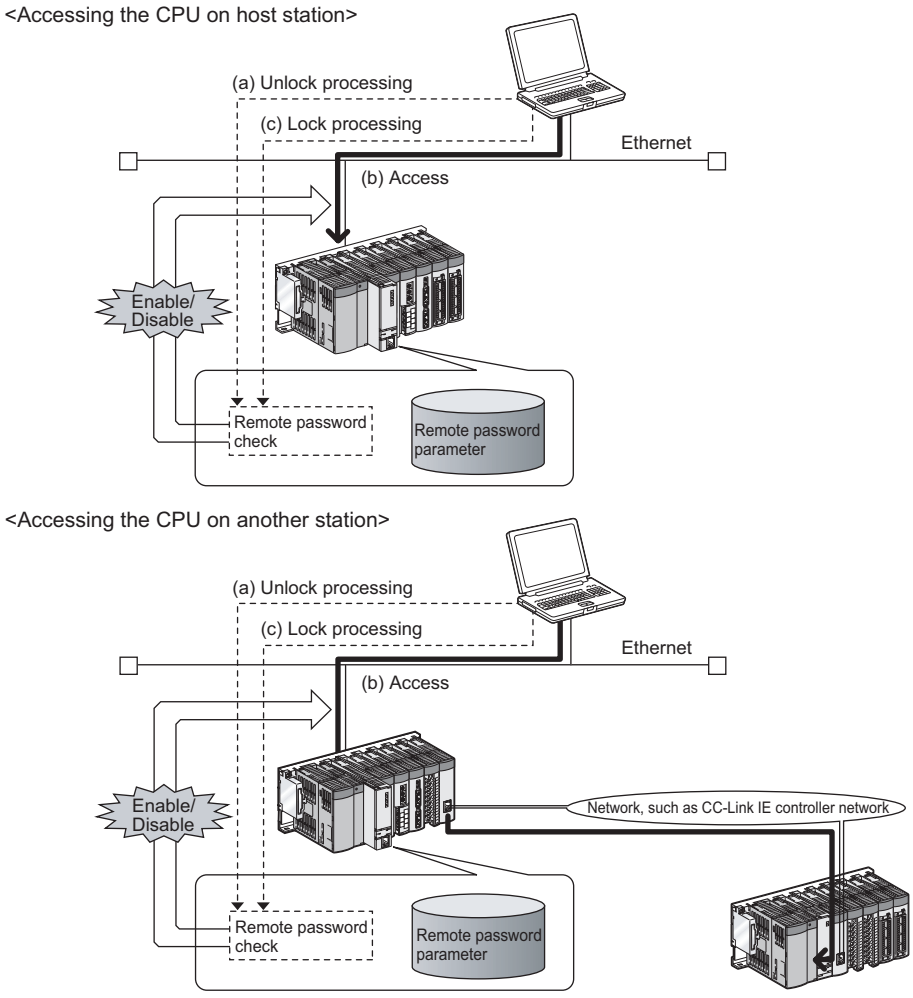


Figure 3.30 Remote password operation overview

3.6.2 Remote password setting

Setting method for remote password is described below.

(1) Setting remote password and writing parameters to CPU module

Set the remote password and the connection target in GX Developer and write the parameter settings to the CPU module.

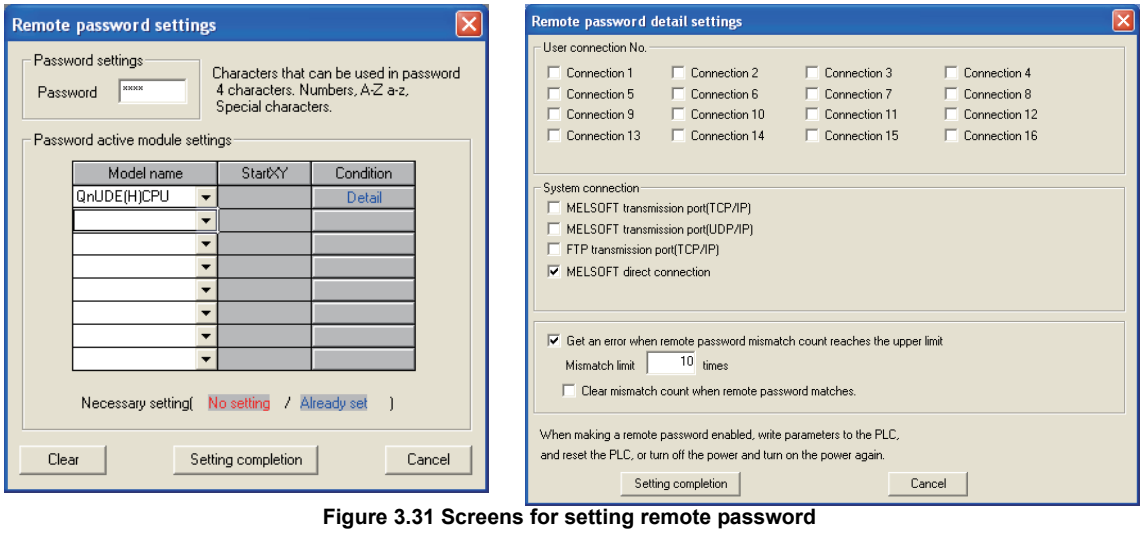


Figure 3.31 Screens for setting remote password

Table3.11 Setting items on the screens for setting remote password

Item		Description	Setting range
Password settings		Enter the remote password to be set in the QCPU.*1	Up to four one-byte characters
Password active module settings	Model name	Select the CPU model to enable the remote password for built-in Ethernet ports of the QCPU module. Only one CPU model is available.	QnUDE(H)CPU
	Condition	Click this to display the Remote password detail settings screen.	Detail
User connection No.	Connection 1 to 16	Select the connection port for which the remote password is to be enabled. (Setting to the unused connection or to the MELSOFT connection is ignored.)	Check the checkbox of target connection.
System connection	MELSOFT transmission port (TCP/IP) *2	Select the connection port for which the remote password is to be enabled.	
	MELSOFT transmission port (UDP/IP) *2*3		
	FTP transmission port (TCP/IP)		
	MELSOFT direct connection		
Get an error when remote password mismatch count reaches the upper limit		Check the checkbox to perform this operation. (To detect unauthorized access.)(☞ Section 3.6.4)	
Mismatch limit		Set the number of mismatch limits.	1 to 65535
Clear mismatch count when remote password matches		Check the checkbox to perform this operation. (To ignore the entry error.)	Check the checkbox of target connection.

*1 : Characters that can be used for remote passwords are one-byte alphanumeric characters and one-byte special characters. (Case-sensitive)
Refer to the following when setting a remote password.
- Avoid using character strings having simple numbers or letters only.
- Combine numbers, letters, and special characters.
- Avoid using character strings, including userís name or date of birth.

*2 : To enable the remote password for the port for which the open system is set to "MELSOFT connection" in PLC parameter, check the checkbox as follows.
- When protocol is set to "TCP", check "MELSOFT transmission port (TCP/IP)".
- When protocol is set to "UDP", check "MELSOFT transmission port (UDP/IP)".

*3 : When connecting GOT with the Built-in Ethernet port QCPU via Ethernet, do not check "MELSOFT transmission port (UDP/IP)".

(2) Enabling parameter settings

After writing parameter settings to the CPU module, settings are enabled by powering the programmable controller ON or resetting the CPU module.

(3) Performing remote password unlock/lock processing

Perform the remote password unlock/lock processing from an external device using respective protocol as follows.

(a) Using MELSOFT connection

Enter the remote password in the following dialog box that appears during communication.
GX Developer performs unlock processing upon entering the remote password and then access the CPU module.

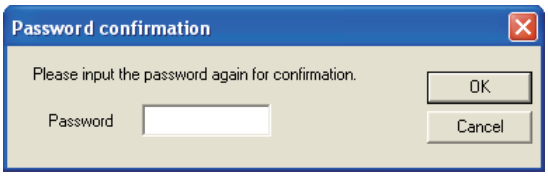


Figure 3.32 Password confirmation screen

(b) Using MC protocol

Use the dedicated commands for the MC protocol.

(c) Using file transfer (FTP server) function

Use the "password-lock"/"unlock" commands.(☞ Section 3.5.5)

3.6.3 Precautions

Precautions for the remote password check function are described below.

(1) Setting remote password to UDP connections

- Determine the communication target external device and do not communicate with unspecified external devices. (The communication target external device needs to be determined since UDP/IP connections can communicate with any other devices, including the device that has performed unlock processing, after the remote password unlocking processing is completed normally.)
- At the end of data communication, always perform the remote password lock processing.
  (If lock processing is not performed, unlock status is held until a time-out occurs. When there is no communication for 10 minutes, the CPU module automatically performs time-out based lock processing.)

To prevent unauthorized access more strictly using the remote password, it is recommended to set all connection protocols to TCP/IP and disable GX Developer direct connection in parameter.

(2) Performing close processing before lock processing for TCP/IP connections

The CPU module automatically performs lock processing.

(3) Remote password valid range

The remote password is valid only for access from the Built-in Ethernet port QCPU for which the parameter settings were made.

When multiple CPU modules are used in a multiple CPU system, set a remote password for each setting target CPU module respectively.

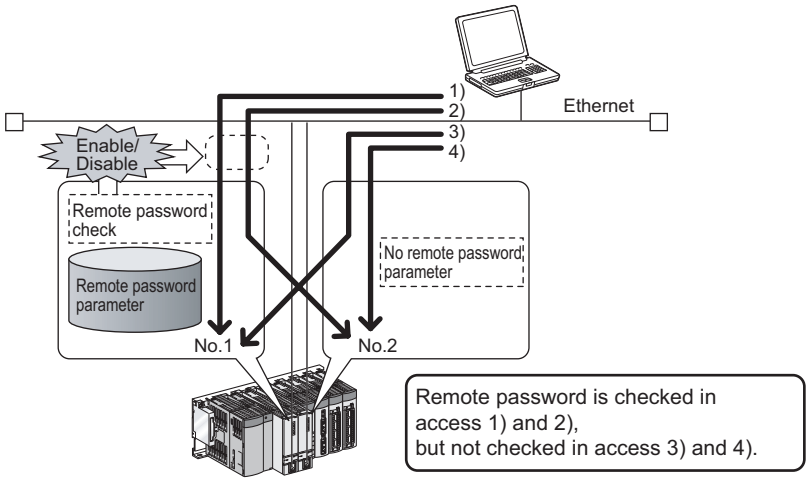


Figure 3.33 Remote password in multiple CPU system

3.6.4 Detection and corrective action of unauthorized access

When remote password mismatch count reaches the upper limit during unlock processing, an error (error code: 2700) occurs in the Built-in Ethernet port QCPU.
The error cause is considered to be unauthorized access from outside of the system.

Perform the following corrective action as needed.

1) Monitor the Remote password count (SD979 to SD999) and check the connection that remote mismatch count reaches the upper limit during unlock processing.
2) Disable the communication by making the corresponding connection invalid. The corresponding connection can be set to invalid by the operation described below.
   - By selecting the target connection on the Status of each connection tab, which is displayed by clicking the "Built-in Ethernet port diagnostics" button on the PLC diagnostics screen in GX Developer.
     (☞ QCPU Userís Manual (Hardware Design, Maintenance and Inspection))

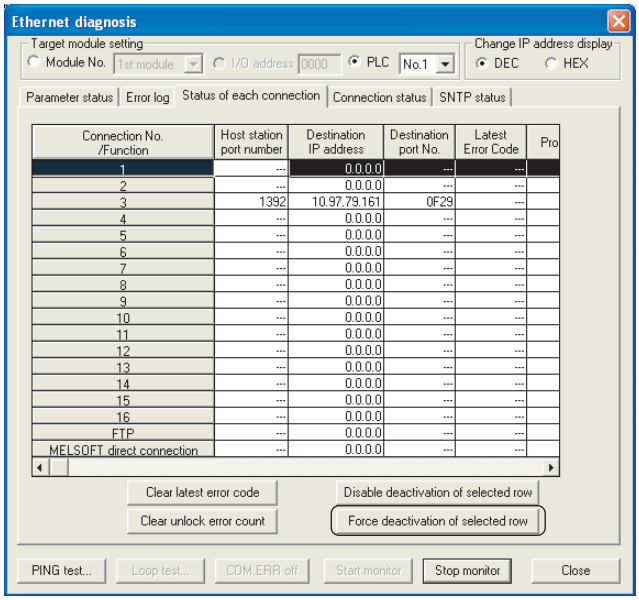


Figure 3.34 Ethernet diagnosis screen

   - By turning ON the forced invalidation flag (bit) of the corresponding connection using the special registers (SD1276, SD1277).
3) Clear the error (error code: 2700).
   The remote password count (SD979 to SD999) is cleared in accordance with clearing of the error.
4) Inform the system manager that the number of error completions of unlock processing is exceeding the mismatch limit and take appropriate corrective actions.

Point

To prevent such errors, perform the following operations.
- Check the checkbox of "Clear mismatch count when remote password matches" on the Remote password detail settings screen in GX Developer.
- Clear the accumulated count of remote password mismatches using the special relay (SM1273).

APPENDICES

Appendix 1 Specifications Comparison with Ethernet Module

TableApp.1 shows the specifications comparison between the Ethernet port of the Built-in Ethernet port QCPU and the Ethernet module (QJ71E71-100).

TableApp.1 Specifications Comparison between Built-in Ethernet port QCPU and Ethernet module

Item			Description	Availability	
				Built-in Ethernet port QCPU	QJ71E71-100
Communication using MC protocol	4E frame		• Reads/writes data in the CPU module from/to an external device. • A frame format that can receive multiple request messages at a time.	×	○
	QnA-compatible 3E frame	Reading/Writing data in device memory	Reads/writes data (device) in the CPU module from/to an external device.	○ *1	○
		Other	Reads/writes data (file) in the CPU module from/to an external device.	×	○
	A-compatible 1E frame		• Reads/writes data in the CPU module from/to an external device. • A frame format that is compatible with A series E71.	×	○
Communication using fixed buffer	With procedure ("Procedure exist")		Sends/receives arbitrary data between the CPU module and an external device using the fixed buffer of the Ethernet module.	×	○
	Without procedure ("No procedure")			×	○
Communication using random access buffer			Reads/writes data from in the random access buffer of the Ethernet module from/to multiple external devices.	×	○
Data communication (sending/receiving) by e-mail			Sends/receives data by e-mail. • Sending/receiving e-mail by the CPU module • Sending/receiving e-mail using the CPU module monitoring function (the automatic notification function) of the Ethernet module	×	○
Communication using data link instructions			Reads/writes data in the CPU module on another station via Ethernet using data link instructions.	×	○
File transfer (FTP server function)			Reads/writes data in the CPU module in file units from/to an external device using FTP commands.	○ *2	○
Communication using Web function			Accesses the CPU module from a personal computer in remote locations via the Internet using a commercially available Web browser.	×	○
CC-Link IE controller network, MELSECNET/H, MELSECNET/10 relay communication			Communicates data in the Ethernet, regarding the system as equivalent to CC-Link IE controller network, MELSECNET/H or MELSECNET/10.	×	○
Router relay communication (Router relay function)			Communicates data via a router or gateway. (The router relay function is not a function by which the Ethernet module works as a router.)	○ *3	○
Send frame setting	Ethernet (V2.0)		Sends data using the frame format selected for the Ethernet header of the data link layer.	○	○
	IEEE802.3			×	○

○ : Function available, × : Function not available

(To the next page)

TableApp.1 **Specifications Comparison between Built-in Ethernet port QCPU and Ethernet module(Continued)**

Item		Description	Availability	
			Built-in Ethernet port QCPU	QJ71E71-100
Existence check of external device (Existence check function)	Check with Ping ("Use the Ping")	Checks the connection status of an external device by sending a Ping message (ICMP Echo) to an external device. Closes the corresponding connection if no response message is received.	×	○
	Check with KeepAlive ("Use the KeepAlive")	Checks the connection status of an external device by sending an ACK message, which notifies an open status of the connection opened using the TCP protocol to an external device.	○ *4	○
Communication using pairing open method		Pairs the receiving and sending connections and opens as one connection. (For communication using the fixed buffer.)	×	○
Communication using automatic open UDP port setting		Enables communication after the station in which an Ethernet module is mounted has been powered ON. (Open/close processing for communication by a sequence program is not required.)	×	○
Remote password check		Prevents unauthorized access to the CPU module by users in remote locations.	○	○
Simultaneous broadcast		Sends/receives data for all external devices on the same Ethernet where the Ethernet module is mounted in data communication using the UDP/IP protocol.	×	○
MELSOFT product (such as GX Developer) and/or GOT connection		Connects a MELSOFT product and/or GOT using the TCP/IP or UDP/IP protocol. Multiple MELSOFT products and/or GOTs can be connected simultaneously.	○	○
Find CPU function		Finds the CPU modules connected to the same hub as GX Developer, and displays a list.	○	×
Time setting function		Collects time information from the time information server and sets time in the CPU module automatically.	○	×
User connection		Connection which is used by user during communications using the MC protocol or the fixed buffer. Can be used as MELSOFT communication port of system connection by setting parameters. Up to 16 connections can be used.	○	○
System connection	Auto open UDP port	Connection which is used by the system only.	×	○
	FTP transmission port		○	○
	MELSOFT transmission port (UDP/IP)		○ *5	○ *6
	MELSOFT transmission port (TCP/IP)		○ *5	○ *6 *7
	HTTP port		×	○
	MELSOFT direct connection		○	×

○ : Function available, × : Function not available

*1 : Available commands are restricted. (☞ Section 3.3)

*2 : The "quote cpuchg" command is not supported. (☞ Section 3.5)

*3 : Only a default router can be specified.

*4 : Settings are fixed to the following: Interval timer: 5 seconds, Resend timer: 8 times.

*5 : Up to 16 MELSOFT products can be connected by setting "MELSOFT connection" for user connections in PLC parameter.

*6 : "MELSOFT transmission port" corresponds to "GX Developer transmission port" of the QJ71E71-100.

*7 : Up to 17 MELSOFT products can be connected by setting "MELSOFT connection" for user connections (including one system connection) in Network parameter.

Remark

For details on Ethernet modules, refer to the following manuals.

☞ Q Corresponding Ethernet Interface Module User's Manual (Basic)

☞ Q Corresponding Ethernet Interface Module User's Manual (Application)

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Warranty

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued.

Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not , compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

(1) In using the Mitsubishi MELSEC programmable controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi programmable controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or Public service purposes shall be excluded from the programmable controller applications.

In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable controller range of applications.

However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.

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SH(NA)-080811ENG-A

QnUCPU
User's Manual

Communication via Built-in Ethernet Port

MODEL	QNUDEHCPU-U-ET-E
MODEL CODE	13JZ29
SH(NA)-080811ENG-A(0812)MEE	

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Specifications subject to change without notice.